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# AUTOMOBILE

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No. 21

NEW YORK, NOVEMBER 23, 1916

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NO DULL-WINTER-  
SEASON FOR



Stewart  
Speedometer  
for Fords  
**\$10**



Stewart  
Motor Driven  
Warning Signals  
**\$6**



Stewart  
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**\$12**



Stewart  
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Motoring is rapidly losing its seasonable aspect. No longer is the automobile for summer use only. This winter at least 75% of the automobiles will be in use most of the time. Comparatively few cars will be put up for the winter.

Can't you see the possibilities for a big winter business on Stewart products?



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SPEEDOMETER CORP.  
Chicago, U. S. A.



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Speedometer  
**\$25**



Stewart  
Spark Plug  
**\$1**



Warner  
Auto-Meter  
**\$50**



Stewart  
Vacuum  
System  
**\$10**



# The AUTOMOBILE

VOL. XXXV

NEW YORK—THURSDAY, NOVEMBER 23, 1916—CHICAGO

NO. 21

## G. M. C.—\$2,250,000 Per Month

37,884 Cars Sold in 3 Months—  
Co. Does 17% of Car  
Export Business

### G. M. C. FINANCIAL FEATURES

Monthly earnings .....	\$2,250,000
Cash on hand .....	20,302,682
Drafts outstanding .....	2,643,445
Inventory .....	30,000 0 00
1917 plant expansions .....	2,055,000

NEW YORK, Nov. 22—General Motors Co. earnings are averaging \$2,250,000 per month, according to President W. C. Durant, who also reported to the stockholders' annual meeting in Jersey City yesterday that cash and drafts on hand Nov. 15 amounted to \$22,946,000, as compared with \$11,311,000 on the same day last year. Mr. Durant stated that the company is doing 17 per cent of the entire export business in passenger cars, and that production for the 3 months ending Oct. 31 was 37,884 cars, a gain of 7612, as compared with the 30,272 manufactured in the same period of 1915.

The stockholders re-elected Mr. Durant president, and made Pierre S. du Pont chairman of the board. A. G. Bishop and C. S. Mott were elected vice-presidents. H. H. Rice is treasurer; T. S. Merrill, secretary; M. L. Prensky, comptroller; Standish Backus, general counsel; L. J. Kaufman, Charles H. Sabin and J. J. Raskob were elected members of the finance committee; and W. C. Durant, A. G. Bishop, C. S. Mott, Weston-Mott; W. E. Chrysler, Buick; W. C. Leland, Cadillac; F. W. Warner, Oakland; W. L. Day and R. H. Collins, General Motors Truck, are members of the executive committee.

Large blocks of material have been acquired by all the General Motors' subsidiaries to take advantage of low priced contracts to provide for increased output. The inventory is now about \$30,-

000,000, or 25 per cent greater than required in normal times. A 20 per cent increase in output by all subsidiaries was predicted by Mr. Durant for the 1917 fiscal year of the company. Cadillac had dealers' orders for 24,000 cars, while at the present rate of production output will reach only 16,500 to 18,000 cars for this season.

Expenditures for improvements and extensions to the plants of the General Motors subsidiaries during the coming year will amount to \$2,055,000.

The stockholders passed a resolution reducing the board of directors from seventeen to fifteen members. The retiring board was re-elected with the exception of A. H. Wiggin, president of the Chase National Bank, who declined re-election. One vacancy remained unfilled, so the board is now made up as follows: Pierre S. duPont, chairman; F. L. Belin, A. G. Bishop, W. P. Chrysler, R. H. Collins, W. L. Day, W. C. Durant, J. A. Haskell, L. G. Kaufman, W. C. Leland, J. H. McClement, C. S. Mott, J. J. Raskob, C. H. Sabin and F. W. Warner.

### Chapin and Coffin Return from Mexican Border

DETROIT, MICH., Nov. 20—Roy D. Chapin, president of the Hudson Motor Car Co. and Howard E. Coffin, vice-president, have returned to Detroit from the Mexican border where they made a study of motor car conditions and of the use of the motor truck and the aeroplane.

### Herman with Bour-Davis

DETROIT, MICH., Nov. 20—L. G. Herman has been appointed production and factory manager of the Bour-Davis Motor Car Co. Mr. Herman was formerly with the Rutenber Motor Co.

### Alter Erecting Plant in Grand Haven

GRAND HAVEN, MICH., Nov. 22—The Alter Motor Car Co. is erecting a plant in this city consisting of four buildings which will be ready Dec. 15.

## \$20,000,000 Cord Tire Co.

Fabricord Tire Co. Absorbs  
Knight Tire Co.—To Add  
Other Units

CANTON, OHIO, Nov. 21—*Special Telegram*—As the first step in a merger of tire manufacturing concerns to represent a total capitalization of \$20,000,000, the Knight Tire & Rubber Co., this city, has been absorbed by the Fabricord Tire Co., of which N. W. McLeod of St. Louis is president. The Fabricord Tire Co. is being formed for the purpose of welding together into one great organization several rubber manufacturing units and will devote particular attention to the production of cord tires under the McLeod patents. Capitalists of New York, Chicago and St. Louis are interested.

### Cordin Leaves Packard

DETROIT, MICH., Nov. 20—A. E. Cordin has resigned from the Packard Motor Car to join the Pluyn-Ochs Co., importer into Russia of automobiles and accessories. Mr. Cordin, who has been Packard assistant sales manager for 6 years, will go to Petrograd to organize a branch for the Pluyn-Ochs company who plans a large expansion following the present war.

### Packard Adjusts Organization

DETROIT, MICH., Nov. 20—H. H. Hills, sales manager of the Packard Motor Car Co., has been appointed to the position of assistant general manager. C. R. Norton, manager of truck sales, has been made the general sales manager. G. R. Bury, manager of carriage sales, has been promoted to the position of assistant general sales manager. These promotions are made to adjust the organization following the resignation of A. E. Cordin.

## 700,000 Ford Cars for 1917

### Big Export Trade Planned—Factory in England—Dodge Suit Hearing Adjourned

DETROIT, Nov. 16.—The Ford Motor Co. plans to build 700,000 cars in 1917, entering automobile markets in every corner of the earth, and has investigators now seeking complete information in Russia, South America, France, England, other European countries, and the various English colonies. The company employs 50,000 men, is under a daily expense of \$800,000, and is 150,000 cars in arrears. Ford stockholders have received \$4,000,000 in dividends since July 31, when the fiscal year ended, and another large cash dividend is being contemplated for Jan. 1, 1917. On Nov. 9, stockholders were voted a 100 per cent dividend on the \$2,000,000 capital stock. The company purchased material between July 31 and Nov. 11 amounting to \$7,304,345.89, and had a bank balance in cash of \$37,938,528.21 in various banks on Nov. 13, 1916. These and many other sums and plans of magnitude were revealed at the hearing of the suit instituted by Dodge Bros. against the Ford Motor Co. to restrain Mr. Ford from spending undivided profits in factory expansion. Other points determined by the hearing show Mr. Ford's salary to be \$150,000, and that of C. H. Wills, factory manager, to be \$80,000 yearly.

Mr. Ford said that in addition to the Manchester plant in England, with a capacity for assembling 18,000 cars yearly, and the Canadian Ford plant with a capacity of 30,000 to 35,000 cars per year, the company will erect a plant in Southampton, England, with a capacity for the complete manufacture of 40,000 cars yearly. This, he said, is done to meet the plan of the allied nations to get together after the war and buy only in those countries favored by the allies.

Mr. Ford defended his policy of price reduction, and said the last reduction of the touring-car price to \$360 was made to insure a 500,000 production, and that this mark was reached with a profit of about \$6,000,000 to the company.

He admitted plans for the erection of blast furnaces at a cost of \$11,000,000, and declared that he had samples of the iron made by the old cupola method and by the new method to be used in his plant, and that the difference was so great that its advantages could be easily observed by an inexperienced person. He estimated the saving effected by the new method to be between \$10 and \$15 per car, and thought it would take about 1 year to make up the expenditure of \$11,000,000 for the new blast furnaces.

F. L. Klingensmith, vice-president of the Ford Motor Co., testified that the dividends for the year ending July 31, 1915, were \$13,000,000, special, in addition to the regular 60 per cent dividend of \$1,200,000. The next year the special was \$5,000,000, in addition to the regular \$1,200,000, or 60 per cent dividend. The company's cash balance on July 31, 1916, was approximately \$52,000,000.

Owing to the refusal of W. L. Dunn, vice-president of the Highland State Bank to testify, the case has been adjourned until Friday.

#### Detroit's 1916 Output 960,000

DETROIT, MICH., Nov. 17.—The value of automobiles produced in Detroit for 1916 amounts to \$650,000,000 as compared with \$330,000,000 in 1915. Automobile makers produced 960,000 cars during the present year, a gain of over 100 per cent, as compared with the 450,000 cars built in 1915. The report, given by the Bradstreet company, also shows that the automobile makers have erected four individual plants, each costing more than \$100,000, and include the structures built by Chalmers, Packard and Continental Motors.

#### Woodard President of Gillette Tire

EAU CLAIRE, WIS., Nov. 18.—S. P. Woodard has become president of the Gillette Safety Tire Co., this city, maker of the Gillette tire. Mr. Woodard recently resigned as general sales manager of the New Jersey Car Spring & Rubber Co., Jersey City, N. J. His office as president of the Gillette company will be in New York.

#### Myers with General Engineering Co.

DETROIT, MICH., Nov. 17.—T. P. Myers has joined the staff of the General Engineering Co. and will have charge of the Doble steam power plant development in the truck field. Mr. Myers was formerly manager of the truck division of the Packard Motor Car Co. in New York.

#### Pettit J. I. Case Vice-President

RACINE, WIS., Nov. 21.—F. R. Pettit, has been appointed vice-president of the J. I. Case Plow Works, Racine, to take effect Jan. 1. He is now general purchasing agent of the J. I. Case T. M. Co.

#### Hastings Holley Chief Engineer

DETROIT, MICH., Nov. 16.—D. T. Hastings has become chief engineer of the Holley Brothers Co., maker of the Holley carburetor.

#### Gloetzner Covert Chief Engineer

DETROIT, MICH., Nov. 22.—A. A. Gloetzner, has become chief engineer and manager of sales of the Covert Gear Co. He was formerly chief engineer of the Bour Davis Co.

## Velie Companies Merge

### More Efficient and Economical Operation—Capital Increased to \$2,000,000

MOLINE, ILL., Nov. 20.—The Velie Motors Corp. has been formed as a result of the merger of the Velie Motor Vehicle Co., maker of the Velie automobile and the Velie Engineering Co., maker of the Velie truck. The merger does not affect the Velie Carriage Co. which will continue to be operated as a separate institution manufacturing a full line of horse-drawn vehicles.

The capital stock of the Velie Motors Corp. has been increased to \$2,000,000, accomplished without the introduction of new capital. Velie stock is not available on the open market.

The personnel of the directorate remains unchanged.

#### Gaulois Tire Changed to Bergougnan—To Manufacture in United States

NEW YORK CITY, Nov. 21.—The Etablissements Bergougnan of Clermont-Ferrand, France, maker of the Gaulois tire, has changed the name of its product to Bergougnan, in both solid and pneumatic types, and will build tires in this country.

The works of the company in France have been taken over almost entirely by the French War Department and the working force is kept busy day and night turning out solid tires for the quartermasters of the army for use on the ammunition and other trucks.

This has seriously interfered with the shipment of tires to this country until now the company proposes to manufacture all of its straight side tires here.

Although this is announced as a temporary measure imposed by the necessities of the war, it is not at all unlikely that it may result in the establishing of a Bergougnan factory in this country.

The American made tire will be offered to the public Dec. 1.

#### Take Up Woodard's Sales Duties

JERSEY CITY, N. J., Nov. 20.—J. W. Paul and L. K. Rittenhouse will have charge of the sales of the mechanical goods and tire department, respectively, of the New Jersey Car Spring & Rubber Co., this city, thus taking up the duties vacated by the recent retirement of S. P. Woodard as general sales manager. Mr. Paul has been assistant sales manager of the company, and was formerly manager of the Diamond Rubber Co.'s Pittsburgh branch. Mr. Rittenhouse comes from the Norwalk Tire & Rubber Co.



## Standard Parts Co. Formed

### Perfection Spring and Standard Welding Consolidated in \$35,000,000 Merger

CLEVELAND, OHIO, Nov. 22—*Special Telegram*—The Standard Parts Co. of Cleveland has been formed by the consolidation of the Perfection Spring Co. and the Standard Welding Co. of this city. The new company is capitalized at \$35,000,000, consisting of \$10,000,000 in 7 per cent cumulative preferred stock, of which half is issued now, and \$25,000,000 common stock, of which \$8,000,000 is issued now. Borton & Borton are offering \$4,000,000 preferred to the public at par. The common stock to be issued has been underwritten by a syndicate and will not be publicly offered.

Officers for the new company have not yet been determined, but the board of directors includes J. H. P. McIntosh, Sr., F. F. Prentiss, H. P. McIntosh, Jr., T. E. Borton, Christian Girl and E. W. Farr, all of Cleveland, and A. H. Goss of New York.

The consolidation eliminates friction regarding the Perlman Rim patents as the Standard Parts Co. has contracts with the Perlman interests, permitting manufacture of demountable rims at a fair profit.

Holders of Perfection Spring preferred stock will receive Standard Parts Co. stock share for share. With Perfection preferred figured at \$110 a share, they may, if they desire, take one share of Standard Parts preferred plus \$10 cash or \$110 a share cash for each share of Perfection preferred. Holders of Perfection common are offered two shares of Standard Parts common for one of Perfection. As Standard Parts common is underwritten at \$85 a share, this is equivalent to \$170 a share for Perfection.

Holders of Standard Welding stock receive \$250 a share cash with the privilege of joining the syndicate underwriting Standard Parts common to the extent that they may underwrite half as many shares of Standard Parts common as they owned of Standard Welding.

The consolidation will constitute the largest maker of automobile springs in the world and one of the largest producers of automobile rims, bands and facings for solid tires, bicycle and motorcycle formed parts and light gage steel tubing. Both companies have a vast amount of business on hand and are covered for the future on raw material.

#### Sun to Market Single Chassis

ELKHART, IND., Nov. 20—The Sun Motor Car Co. will market a single chassis for 1917 and this will carry five-passenger touring, seven-passenger touring, four-passenger roadster and five-passenger sedan bodies, the prices remaining \$1,095 to \$1,295. The standard finish of all bodies is royal blue with cream wheels, and equipment includes the newest type of slanting windshield. The car is powered with a 3½ by 5 detachable-head, block-cast motor, and power is transmitted through Borg & Beck plate clutch to a three-speed gearset; the axle is floating. Other specifications include Remy starting, lighting and ignition, Rayfield carbureter, Stewart vacuum fuel system, and Jacox steering gear. The wheelbase is 116 in. and the tires are 34 by 4, non-skid in rear.

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**Moyer Resigns from Champion Ignition**

DETROIT, MICH., Nov. 17—Arthur W. Moyer has resigned his position with the Champion Ignition Co., where he handled the factory business. Mr. Moyer was formerly with A. R. Mosler & Co. He will return to his original business, the Moyer-Shaw Mfg. Co.

#### Merrill Purchasing Agent for Hood

DETROIT, MICH., Nov. 16—Instead of R. B. Newell, as announced last week, it was R. B. Merrill who was appointed as purchasing agent for the Wallace C. Hood Service Bureau. Mr. Merrill was formerly connected with the Packard Motor Car Co.

#### Macey Harroun Sales Manager

DETROIT, MICH., Nov. 20—J. W. Macey has been appointed sales manager of the Harroun Motors Corp. Mr. Macey was formerly connected with the Ford Motor Co.

#### Taylor with White Star Refining

DETROIT, MICH., Nov. 20—Kirk Taylor has been appointed sales manager for the White Star Refining Co. Mr. Taylor was formerly with the Evapco Mfg. Co.

#### Collins to Join Parker Rust Proof

DETROIT, MICH., Nov. 17—B. W. Collins, formerly assistant to Walter Fry, president of the Springfield Body Co. has joined the staff of the Parker Rust Proof Co.

#### Cornelius with Parker Rust Proof

DETROIT, MICH., Nov. 20—W. M. Cornelius has been appointed as assistant to the president of the Parker Rust Proof Co. Mr. Cornelius was formerly the secretary of the Security Commission at Lansing.

#### Selden Truck Co. Advances Dupuy

ATLANTA, GA., Nov. 21—C. L. DuPuy, who for the past 5 years has been representing Selden trucks in the local territory, will, on Dec. 1, become southern division sales manager of the Selden Truck Co., Rochester, N. Y.

## Five Cos. Raise Car Prices

### Packard, Kissel, Marmon, Empire and Paige Feel High Production Costs

DETROIT, MICH., Nov. 20—Packard Motor Car Co. has increased the price of the model 225, the smaller Twin-Six, \$185, and the larger Twin-Six, model 235, \$235, making the new prices, \$3,050, and \$3,500 respectively on all open cars. This applies to all deliveries after Feb. 1 and before that date to any cars built after 4500 of the new models have been produced. Increased cost of manufacture is the reason for the raise.

#### Kissel Price Advance Determined

HARTFORD, WIS., Nov. 21—The Kissel Motor Car Co. will increase the prices of the Hundred Point Six models on Dec. 1, 1916. The five-passenger touring and three-passenger roadster, not built for the All-Year top will be \$1,195, an increase of \$100. The four- and five-passenger Gibraltar models, built for the All-Year top will advance from \$1,195 to \$1,285; the five-passenger Victoria, with the detachable town car top will be \$1,950, an increase of \$100; the five-passenger All-Year Sedan and the four-passenger All-Year Coupé, both including the summer tops will advance from \$1,520 to \$1,635. Wire wheels will be supplied for \$100 extra.

#### Marmon Prices Will Advance \$150

INDIANAPOLIS, IND., Nov. 20—Nordyke & Marmon Co., will advance its prices \$150 on Jan. 1, 1917. The new prices will affect cars purchased from this date for delivery after the first day of the coming year. Cars ordered, however, for delivery before Jan. 1, will be sold at the old prices. The Marmon touring car is now selling at \$2,950.

#### Empire to Advance Prices

INDIANAPOLIS, IND., Nov. 20—The Empire Automobile Co. will advance prices on all its models soon after Dec. 20. Dealers are guaranteed present prices only until that date. The advance probably will be between \$70 and \$100.

#### Paige to Increase Prices

DETROIT, MICH., Nov. 20—The Paige-Detroit Motor Car Co. will increase the prices of its cars on Jan. 1, 1917.

#### Doak Joins Ohio Electric

TOLEDO, NOV. 22—R. R. Doak has become assistant sales manager of the Ohio Electric Car Co., this city. Mr. Doak was formerly manager of the St. Louis branch of the Woods Motor Vehicle Co., Chicago.

## Akron—The Miracle Tire City

**\$203,100,000 Worth of Rubber Products Manufactured—54,000 Tires a Day**

**A**KRON, OHIO, Nov. 17—More than 11,522,650 tires will mark the total production from Akron for 1916. Business for the year will amount to \$203,100,000 gaged by the output of the past 11 months, an increase of 65 per cent over the preceding year. Some idea of the vast and stupendous industry may be had from the fact that 158,315 freight cars are necessary to carry the year's production to the various destinations. The City, which in 1910 had a population of only 69,000, now has 51,150 people employed in rubber manufacture. Floorspace covering 88 acres and machinery costing more than \$2,500,000 have been added in 1916 and 12,005,000 sq. ft. of floorspace is now devoted to the rubber industry. Present capacity as increased by recent additions allows a daily total output of 54,000 tires.—19,837,750 for 12 months. This is approximately equal to existing demand and it is a safe prediction to state that Akron will manufacture more than 20,000,000 tires in 1917.

Every factory is operating to full capacity, erecting still more buildings, planning on a greater increase of machinery, and bending every effort to meet the constantly growing demands. Goodrich has added 21 acres of floorspace and hundreds of intricate and expensive machines to its plant, and at present is erecting new structures as quickly as men and materials can be secured. The company has a total floorspace exceeding 100 acres. The numerous buildings stretch over many of Akron's streets and are connected by a tunnel system more than 5 miles long. Over 20,000 men are employed, who work in three 8 hr. shifts. Business for this year, judged by a report of the first 8 months, will total \$77,000,000 as compared with \$55,416,000 in 1915. The daily capacity at the Goodrich plant is 20,000 tires.

Goodyear announces a total business of \$63,000,000 for this year as against \$37,000,000 in 1915, an increase of 85 per cent. The company employs 15,000 men, occupies 75 acres of floorspace and has a daily capacity of 17,000 tires. Factory additions totaling more than 30 acres have been made in the past year. The company manufactured 2,000,000 tires in 1915, approximately 3,500,000 for 1916, and plans to produce 6,000,000 next year.

Firestone has increased the number of men employed from 3900 in 1915 to 8000 in 1916, an excellent gage to the growth

of the institution. Factory additions total 11 acres for the past year and give the company 37 acres of floorspace. The company handles approximately sixty-five freight cars daily for shipment of its products. The factories are unique in construction, manufactured with brick, steel and glass, and consisting of four sections, each 700 ft. long and five stories high, but practically under one roof. Business for 1916 amounts to \$33,250,000 as compared with \$25,000,000 in 1915. Machinery and other equipment costing \$1,500,000 has been added and has increased the daily capacity to 12,500 tires.

Miller, General and Kelly-Springfield, have each enjoyed a remarkable growth. Additions of 24 acres of floorspace have been added to the Miller plant and the capacity has been increased from 1000 to 3000 tires per day. The company manufactured 125,000 tires in 1915, 300,000 in 1916, and plans to produce 500,000 next year.

Swinehart occupies 80,000 sq. ft. of floorspace and increased their business from \$1,250,000 in 1915 to \$1,500,000 in 1916. It employs 400 men and has a daily capacity for about 500 tires.

General has added 35,000 sq. ft. of floorspace and more than doubled its business in the past year.

An eight-story building is in process of erection on the Miller company's grounds to replace several old structures. When this is completed the concern will have approximately four times as much floor space as they occupied 10 months ago.

### Gillette Tire Installing Machinery

EAU CLAIRE, WIS., Nov. 18—The first shipments of machinery and other equipment for the new plant of the Gillette Safety Tire Co., Eau Claire, Wis., have arrived and are now being installed. It is possible that first operations will be possible shortly after Dec. 1, with the entire works operating by Jan. 1.

### Bukolt Tire Protector in New Plant

STEVENS POINT, WIS., Nov. 18—The Bukolt Tire Protector Co., Stevens Point, Wis., is taking occupancy of its new factory. The output of steel tire protectors will be increased from 50 pairs a day to 300 pairs. The tire protector business will be incorporated as soon as possible and will have a capitalization of about \$200,000.

### Auto Body Co. Increases Floor Space

LANSING, MICH., Nov. 17—The Auto Body Co. is erecting ten additional dry kilns which will make a total floor space of 10 acres occupied by the company for the manufacture of their products. The kilns will cover ground 99 by 165 ft. which the company recently purchased.

## Briscoe Plant on West Coast

**Will Cost \$500,000—Mr. Briscoe on Coast to Determine Station**

DETROIT, MICH., Nov. 17—The Briscoe Motor Corp., Jackson, Mich., will erect an assembly plant at a cost of approximately \$500,000 at one of the larger cities on the Pacific Coast. Benjamin Briscoe, president and L. E. Wilson, vice-president, of the corporation will leave for California in the next few days and will determine the location. The Briscoe factory is reaching out after business on the western coast of South America, as well as Australia, New Zealand, Japan and Russia, and plans to have a plant with a capacity for assembling 20,000 cars a year.

The company has recently completed the factory at Jackson and at the present time occupies 48 acres of floor space in ten separate buildings.

### Dann Products Opens Cleveland Plant

CLEVELAND, OHIO, Nov. 20—The Dann Products Co., maker of Dann spring lubricating inserts, has opened its new plant here. The building is of modern brick and steel construction with ample lighting and ventilation provisions. In spite of the 30,000 sq. ft. of floorspace which the new plant contains, the company is already planning to enlarge it and additional land has been secured for this purpose.

### Fire Damages Saxon Plant

DETROIT, MICH., Nov. 20—Fire at the plant of the Saxon Motor Car Corp., to-day, damaged a structure used for truck production, and a part of the building used for offices, to an extent estimated at \$60,000. The loss is covered by insurance and will in no way hinder the productive facilities of the concern. In fact, production was in process within 1 hr. after the fire had been overcome. The fire was started by an employee who held a lantern while he poured gasoline into the truck tanks.

### Anderson Electric Expands Cleveland Plant

DETROIT, MICH., Nov. 17—W. C. Anderson, president; William Lock, treasurer, and Wilson Critzer, auditor of the Anderson Electric Car Co., are in Cleveland, arranging final details for extensions to the company's Cleveland plant, where motors and other parts of Detroit Electric cars are manufactured.



## Carl Fisher in Tractor Co.

### To Build One-Wheel Machine in Indianapolis—New Factory Being Built

INDIANAPOLIS, Nov. 20—Carl G. Fisher, president of the Prest-O-Lite Co. and also the motor speedway here, has taken another step in the automobile trade following closely upon the announcement of the vacuum brake by his concern a few weeks ago. The latest Fisher activity is in the farm tractor field. For some time it has been known that Mr. Fisher has been in Detroit examining a one-wheel tractor design developed there some months ago. Plans have progressed rapidly for the manufacture of this tractor and to-day a factory is being built here for its manufacture. Concrete for the factory is being poured and the building will be complete in 90 days.

The organization of the company is not entirely completed as yet, but C. B. McCutcheon, president of the Ross Automobile Co., Detroit, will be president. The other officials are not yet known. The services of one of the best known men in the trade has been secured as factory manager.

The one-wheel tractor to be built has been examined by many in the industry during the last year and has been very favorably considered. It has given convincing demonstrations of its ability to work on all kinds of soil.

#### Ford Tractor Co. Formed in Del.

DETROIT, MICH., Nov. 17—The Ford Tractor Co. has been incorporated under the laws of Delaware to manufacture tractors and other machinery. The capital stock is \$1,000,000. Incorporators are W. Baer Ewing and C. M. Hertig, of Minneapolis, and F. D. Buck, of Wilmington, Del.

#### Lane Here from Australia

NEW YORK CITY, Nov. 22—R. T. Lane, representing the Chevrolet in Melbourne, has arrived in this city. Mr. Lane states that since the outbreak of the war there has been an increasing demand in the Antipodes for goods of American manufacture. Business conditions are prospering in Australia.

#### Compensating Driving Axle on Market

PHILADELPHIA, PA., Nov. 16—A new device to prevent skidding called a compensating driving axle to take the place of the differential will be put on the automobile market by the A. C. Axle Mfg. Co., this city, formed this year with a capital of \$1,000,000 to manufacture this

invention for use on old and new cars. This new driving mechanism is equipped with ratchet clutches in the axle, instead of the gear wheel system of the differential. A feature is a positive drive on both wheels. In turning a corner the wheel on the short curve drives the car, the wheel on the long curve compensates the difference.

J. D. Allen, the inventor, has estimated the cost of equipping a car with this invention at \$175.

The officers of the company are: J. D. Allen, president; A. P. Fisk, vice-president; A. C. Bunnell, secretary; and H. W. Savage, treasurer.

#### Cocorda and Giaugue, Peugeot Engineers, Here Visiting Factories

NEW YORK, Nov. 18—Two Peugeot engineers are at present in this country visiting several of the automobile factories. They are Messrs. Guido Cocorda, chief engineer, and Albert Giaugue, chief of the service department of the Peugeot factory in Paris. They expect to be in this country until Dec. 15. At present the Peugeot company is engaged in the manufacture of aviation engines, motor trucks, and munitions. The factory has been more than doubled since the start of the war. The manufacture of passenger cars has practically ceased, but in the near future will be taken up.

#### Sterns Tire & Tube Co. of Canada Formed

DETROIT, MICH., Nov. 17—The Sterns Tire & Tube Co. of Canada, Ltd., has been formed with an authorized capital of \$1,000,000. It will locate at Windsor with a one-story factory, 100 by 150 ft.

Officers of the company include N. J. Morrissey, Pickering, Ont., president; Edward Sterns, St. Louis, Mo., director and consulting engineer; C. J. Gibson and A. S. Chapin, Toronto, directors; E. M. Carruthers, Toronto, secretary and treasurer.

#### Pirelli Sails for Italy

NEW YORK CITY, Nov. 20—G. A. Pirelli, son of the owner of the Pirelli Tire Co., Bicocca, Italy, who visited this country and South America this year, has sailed for Italy. Mr. Pirelli visited the two countries on account of a possible large sale of the Pirelli tires. While in this country Mr. Pirelli made extensive purchases of machinery for the enlargement of his plants in Bicocca, Italy, Barcelona, Spain and Southampton, England.

#### Assmus Goes to Cuba for Maxwell

DETROIT, MICH., Nov. 17—C. O. Assmus, in charge of sales promotion of the export department of the Maxwell Motor Co., left Detroit for Cuba, Nov. 16, where he will be stationed for a month.

## Ford Cars To Use Kerosene

### Holley Kerosene Carbureter On Sale in Ford Sizes in U. S. Feb. 1

NEW YORK, Nov. 18—The use of kerosene as an automobile fuel will probably be considerably forwarded by the fact that the Holley company contemplates selling kerosene carbureters for Ford equipment in this country and England. Beginning with Jan. 1 delivery in England the Holley kerosene carbureter will be sold for equipment on Ford cars; and beginning with Feb. 1 it will be for Ford equipment in the U. S. A.

#### Duplex Truck Co. Formed — \$1,000,000 Capital

DETROIT, MICH., Nov. 20—The Duplex Truck Co., capitalized at \$1,000,000, has been organized to take over the Duplex Power Car Co., Charlotte. The new company will move the business to Lansing where a site will be purchased and a factory erected.

This company was the first to build an internal gear-driven four-wheel-drive truck. The Jeffery Quad is built under its license.

Under the new organization H. M. Lee, assistant sales manager of the Reo company, is president and general manager; H. E. Bradner, vice-president; G. W. Hewitt, credit manager of the Reo company, is secretary and treasurer; Harry Harper and Elgin Mifflin, directors of the new company. The officers of the old company were F. P. Town, president; Fred Murray, secretary; H. H. Bryan, treasurer, and F. L. King, vice-president.

#### L-M-H Development Co. to Make Tractors

DETROIT, MICH., Nov. 16—The L-M-H Development Co. has been formed as a holding company capitalized at \$30,000 for the development and construction of a tractor, an invention of H. M. Leonard. Incorporators are John Hurlburt, Detroit; H. M. Leonard, who has been chief engineer of the Duplex Power Car Co., Charlotte, Mich., and Clarence Martin, Jackson, Mich. It is later planned to organize a larger company. Mr. Leonard claims that his new tractor will run equally well in either direction and has four speeds forward and also in reverse, that it will turn in a circle the radius of which is its wheelbase, and that it will pull three plows. It is a four-wheel drive, weighs 3300 lb. and will sell for \$800. The larger company will probably be organized in July, 1917.

## Peugeots Win Road Classics

Resta Captures Championship—  
Wins Vanderbilt—Aitken  
Wins Grand Prize

### GRAND PRIZE WINNERS

Car	Driver	M.P.H.	Prize
Peugeot	Aitken-Wilcox	85.59	\$4,000
Stutz	Cooper	83.74	2,000
Hudson	Patterson	78.13	1,000
Hudson	Roads		500

### VANDERBILT WINNERS

Peugeot	Resta	86.98	\$4,000
Stutz	Cooper	83.74	2,000
Duesenberg	Weightman	79.46	1,000
Hudson	Roads		500

### CHAMPIONSHIP AWARDS

	One	Two	Three	Trophy
A. A. A.	\$7,000	\$4,000	\$2,500	Cup
Bosch	2,000	1,000	500	Cup
Goodrich	5,000	3,000	2,000	
Total	\$14,000	\$8,000	\$5,000	

SANTA MONICA, Nov. 22—The two road racing classics, the Vanderbilt, won by Resta, and the Grand Prize, won by Aitken, practically closed the American racing season last Thursday and Saturday on the Santa Monica course. The two events brought forth new records and as keen a competition as has been seen this year. As both races were included in the American Automobile Assn. championship standing with but 660 points difference between the two leaders, Resta and Aitken, it was naturally expected that America's two premier road races would result in a sharp battle for the coveted position as the premier racing driver of the United States, and the championship award of \$14,000 given by the A. A. A. and the Bosch and Goodrich companies. Resta had \$6,000 difference between first and second position awards, the last race, the Grand Prize, brought out not only keen competition between Resta and Aitken, but also established a precedent in American racing events. As Resta had won the Vanderbilt and had 4100 points much depended on the winning of the Grand Prize by Aitken to overcome his lead in points. Aitken had 3440 points.

As Aitken had dropped out in the first lap on account of a broken piston, his chances for the coveted points were nil. It was, however, thought that if he could take Wilcox's place in his Peugeot and thereby win the race, he would be entitled to a proportionate number of championship points. As a result, quite a little controversy developed when he did win and the precedent was sustained by the A. A. A.

### Resta Now Champion

Resta is now the undisputed claimant of the championship title, as Aitken, it is stated, will not race at the Ascot Speedway on Thanksgiving Day, the last championship event. Incidentally, Resta first definitely established his standing as a racing driver in this country at last

## 1916 Speedway Champion



Dario Resta

### A. A. A. 1916 CHAMPIONSHIP AWARD STANDING

Dario Resta	4100	E. O'Donell	185
*John Aitken	3440	C. J. Devlin	140
Rickenbacher	2210	Arthur A. Klein	125
Ralph De Palma	1790	Jack LeCain	120
W. D'Alene	1120	Barney Oldfield	80
Earl Cooper	1045	Earl Devore	80
Thomas Milton	690	Omar Toft	75
Pete Henderson	667	E. Pullen	70
F. Calvin	645	Ora Hable	60
Ralph Mulford	620	Mel. Stringer	55
H. Wilcox	596	George Adams	55
J. Christiaens	540	Jack Gable	45
Dave Lewis	500	Billy Chandler	40
Ira Vail	450	Bert Watson	35
P. Devigne	350	Sorenson	35
Clyde Roads	280	Art. Johnson	30
Hughie Hughes	275	J. A. Benedict	30
A. H. Patterson	270	F. McCarthy	25
W. Wightman	240	Andy Bart	25
Geo. Buzane	210	W. J. Muller	20

\*No credit given by A. A. A. for winning Grand Prize as changed cars.

year's Vanderbilt and Grand Prize by winning both events, a feat never before paralleled. This year he was on his way to repeating the former performance but was put out in the eighteenth lap.

This year the race was run only by the American Automobile Assn. and not under the joint jurisdiction with the Automobile Club of America, which controlled the Grand Prize.

## Wilcox-Aitken Car Winner

Aitken Relieves Team-mate in  
Grand Prize—Receives  
No Points

SANTA MONICA, CAL., Nov. 18—*Special Telegram*—A Peugeot, driven by Wilcox and Aitken, won the 403.249-mile Grand Prize road race to-day over the 8.04-mile oblong Santa Monica course, establishing a new record for that classic of 4 hr., 42 min. and 47 sec., or 85.59 m.p.h., as against 7 hr., 7 min. and 57 sec., or 57.50 m.p.h. in the 1915 race at San Francisco, made by Resta in a Peugeot. Cooper in a Stutz finished second, averaging 83.74 m.p.h. To-day's race not only established new records but it also established a precedent in the awarding of points in the championship events. Wilcox, who drove the winning car for the first twenty laps, receives 416 points, or 20.8 points for each lap. Aitken, who relieved Wilcox and drove the remaining 28 laps, according to the A. A. A. decision, receives no points. As a result, Resta retains his lead in the championship race and may be called the leading driver of 1916. The precedent established before this race was that set by Rickenbacher this year at Indianapolis when he was refused points after having taken Henderson's Maxwell as relief driver and finishing within the money. Included in the records to-day is that of a new world's non-stop road race record made by Patterson in a Hudson Super-six which finished third, averaging 78.13 m.p.h. Roads, also driving a Hudson, finished fourth, which is the same position he held in the Vanderbilt last Thursday.

Much depended upon to-day's race if Aitken was to overcome Resta's lead in

### ELIMINATIONS IN GRAND PRIZE RACE

Car	Driver	Lap	Reason
Peugeot	Aitken	1	Broken piston
Hercules	Agraz	2	Broken rod
Kissel	Anderson	5	Broken valve
Duesenberg	Moosie	6	Broken clutch
Owl Special	Carlton	6	Broken pump shaft
Mercer	Pullen	8	Burned up
Hudson	Vail	9	Burned bearing
Omar	Toft	10	Burned clutch
Gandy	Price	10	Broken clutch
Marmon	Jackson	13	Wreck
Durant Special	Durant	17	Broken valve
Cody Special	Cody	33	Motor trouble
Peugeot	Resta	18	Motor trouble
Duesenberg	Rickenbacher	26	Broken drive shaft
Duesenberg	Buzane	27	Broken piston
Mercer	Ruckstell	39	Broken pressure line

### ELIMINATIONS IN THE VANDERBILT CUP RACE

Car	Driver	Lap	Reason Assigned
Gandy Special	Price	4	Burned clutch
Cody Special	Cody	5	Axle trouble
Duesenberg	Rickenbacher	6	Sheared high gear
Owl Special	Carlton	6	No tires
Mercer	Ruckstell	8	Ignition
Omar	Toft	9	Connecting rod
Marmon	Jackson	10	Motor trouble
Duesenberg	Moosie	11	Sticking valves
Mercer	Thomas	12	Radiation
Duesenberg	Buzane	15	Cracked cylinder
Peugeot	Aitken	19	Broken intake valve
Mercer	Pullen	31	Motor trouble
Chowchilla	Bolden	31	Broken crank shaft



points in the American Automobile Assn. championship race, and as a result every possible means to win the coveted points and \$14,000 in prize money was resorted to. Consequently when Aitken, who was in second place, just 660 points behind Resta in the championship column, dropped out, after the first lap with a broken piston, his chances for winning the race looked slim.

However, when Wilcox was signalled to stop in the fifth lap, it was soon apparent that Aitken would attempt to win the race in Wilcox's car. Wilcox stopped in the ninth lap, stating that he was tired and asked to be excused, but was refused permission. He was in second position at the time of his stopping when he lost 2 min. On the fifteenth lap he took the lead, his average at that time being 87 m.p.h.

#### Resta to the Pits

On the sixteenth lap Resta went into the pits and changed two spark plugs, came in again on the seventeenth lap and on the eighteenth dropped to fifth position. At this time he was running on three cylinders and came in again, took down the motor and worked 2 hr. changing the wiring and installing another magneto.

With Resta out of the race, Wilcox again stopped in the twentieth lap when holding first position and asked to be relieved on account of sickness, which was permitted. His average up to this time was 87.14 m.p.h.

Aitken then took Wilcox's place, driving at top speed, his average at thirty laps being 86.6 m.p.h.; forty laps, 86.4 m.p.h., and forty-five laps, 86.08 m.p.h. In his forty-sixth lap he ran out of gas in the back stretch. He took on more gasoline in the forty-seventh lap and finished the forty-eighth lap at an average speed of 84.59 m.p.h., a new record for the Grand Prize.

After Aitken took Wilcox's place, Resta offered to buy Cooper's Stutz to get back into the race but the proposition was not

## Vanderbilt Record Broken

Covers 294.035 Miles in Vanderbilt at 86.98  
M. P. H.

SANTA MONICA, CAL., Nov. 16—For the second successive time, Dario Resta has won the Vanderbilt cup race, breaking the previous record by 11 m.p.h. The 294.035 miles of the road race was covered in 3 hr., 22 min., 48.4 sec., an average speed of 86.98 m.p.h.; the victory giving Resta the lead in the American Automobile Assn. \$13,500 prize contest.

Though the three leaders broke the previous record of 78.72 m.p.h. for this course, made by Teddy Tezlaff in 1912, it was a race unmarred by serious accidents. At sharp noon nineteen drivers started the long grind over the 8.401-mile triangular course, before an audience of thousands. To the fourteenth lap it was a battle between Aitken, Cooper and Resta, with Resta steadily pushing to the front. At the fourteenth lap he took the lead, and after Aitken dropped out in the twentieth lap with a

broken crankshaft, Resta maintained a steady pace to the finish.

Cooper came in approximately 8 min. behind Resta, with William Weightman, a Virginia sportsman, and a dark horse, running third in 3:42:00.4. The only other survivors were Clyde Roads, Vail and Patterson, the latter two being flagged while still running.

Mechanical troubles caused most of the eliminations, Bolden alone suffering from the dangerous turns. He skidded and went out in the twenty-first lap, and was the thirteenth man to quit. Eddie Pullen was disqualified on his thirtieth lap, while running fourth, because of an illegitimate stop for gasoline.

The race was well attended. On the straightaway temporary bleachers were erected facing the ocean. These were packed and the race was run through a lane of spectators around practically the entire course.

Up to to-day the Vanderbilt record was held by Ralph de Palma, made over the Santa Monica course in 1914, at an average of 75.6 miles per hour, though this was not the Santa Monica course record. Resta, in addition to acquiring additional laurels, added \$4,000 to his winnings. Cooper received \$2,000, Weightman, \$1,000, and Roads, \$500.

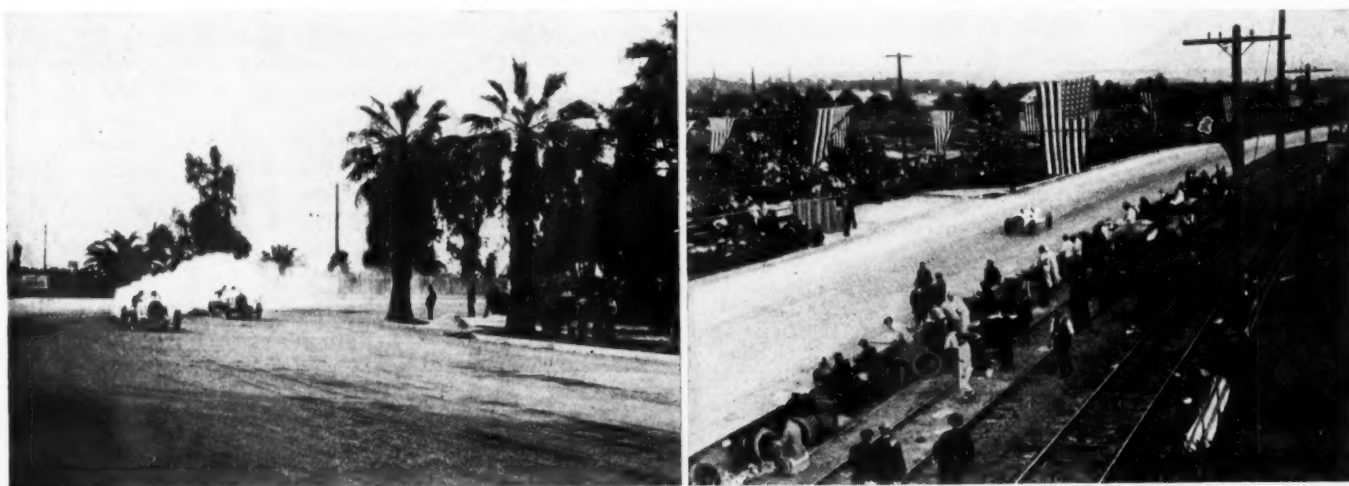
made. Cooper drove a very consistent race. Resta, Aitken, Wilcox, Pullen and Ruckstell in Mercers and Rickenbacher in a Duesenberg passed him but he never varied the pace.

Rickenbacher relieved Weightman, taking his Duesenberg in the thirtieth lap, but failed to finish, although this was the only car running after the four winners had finished. Twenty-one cars started the race. Only three tire changes were made throughout the race, although the pit stops numbered thirty-three.

Fourteen starters in the Vanderbilt cup race used Rajah plugs, as did the first six finishers except Resta and Patterson. In the Grand Prize the same

number of starters used Rajah plugs, and of those finishing all except Aitken and Patterson. Goodrich Silvertown cord tires were on the first four Vanderbilt winners and Goodyear cords on the first three in the Grand Prize.

Only one of the leaders in the championship award table made any appreciable gain in the Vanderbilt and Grand Prize events last week and he was Resta, chalking up 900 points when he won the first race. This brought his score up to 4100, just 660 ahead of his rival Aitken, who had 3440. Aitken, as explained in the previous paragraphs, did not gain a point. Cooper moved from eleventh position to sixth with a total score of 1045.



Two views in Vanderbilt Cup Race. At the left is Death Turn and at the right a glimpse of the straight-a-way

Material	Tues.	Wed.	Thur.	Fri.	Sat.	Mon.	Week's Ch'ge
Aluminum, lb.	.65	.65	.65	.65	.65	.65	
Antimony, lb.	.12½	.12½	.12½	.12¾	.13½	.13½	+ .01
Beams and Channels, 100 lb.	2.97	2.97	2.97	2.97	2.97	2.97	
Bessemer Steel, ton.	50.00	50.00	50.00	52.50	52.50	52.50	+2.50
Copper, Elec., lb.	.33	.33	.33	.33	.33	.33	
Copper, Lake, lb.	.33	.33	.33	.33	.33	.33	
Cottonseed Oil, bbl.	12.72	12.85	12.55	12.75	12.65	12.75	+ .03
Fish Oil, Menhaden, Brown, gal.	.62	.62	.62	.62	.68	.68	+ .06
Gasoline, Auto, bbl.	.22	.22	.22	.22	.22	.22	
Lard Oil, prime, gal.	1.30	1.30	1.30	1.30	1.30	1.30	
Lead, 100 lb.	7.05	7.05	7.05	7.05	7.05	7.05	
Linseed Oil, gal.	.98	.98	.96	.96	.98	.96	— .02
Open-Hearth Steel, ton.	50.00	50.00	50.00	52.50	52.50	52.50	+2.50
Petroleum, bbl., Kans. cude.	.90	.90	.90	.90	.90	.90	
Petroleum, bbl., Pa., crude.	2.60	2.60	2.60	2.60	2.60	2.60	
Rapeseed Oil, refined, gal.	.95	.95	.95	.95	.95	.95	
Rubber, Fine Up-River, Para, lb.	.82	.82	.80	.80	.80	.80	— .02
Rubber, Ceylon, First Latex, lb.	.66½	.66½	.66	.67	.67	.67½	+ .01
Sulphuric Acid, 60 Baume, gal.	1.50	1.50	1.50	1.50	1.50	1.50	
Tin, 100 lb.	44.38	44.88	45.00	45.00	45.00	45.25	+ .87
Tire Scrap, lb.	.06¾	.06¼	.06¼	.06¼	.06¼	.06¼	+ .00½



a capital of \$100,000 which was doubled in 1911. The plant is now producing to the limits of its capacity and according to present indications will manufacture \$1,250,000 worth of their products for the coming year.

#### Madison Motors Stock Offered

ANDERSON, IND., Nov. 20—A part of the Madison Motor Co.'s \$2,000,000 capital is to be sold in small blocks at \$10 a share by H. M. Caldwell & Co., Indianapolis, sole distributors of the stock.

#### Dividends Declared

The Federal Rubber Co.; regular dividend \$1.75 per share on second preferred stock, payable Nov. 25.

Ajax Rubber Co., quarterly of \$1.25 per share, payable Dec. 15 to stock of record of Nov. 29.

Studebaker Corp., South Bend, regular 1% per cent on preferred and 2½ per cent on common, payable Dec. 1 to stockholders of record at the close of business on Nov. 20.

#### Truck Wheel Corp. Formed

CHICAGO, ILL., Nov. 21—The American Truck and Wheel Corp. of Chicago, which is capitalized at \$1,000,000, has filed charter in Delaware to manufacture motor truck wheels, etc. The incorporators are William C. Loftus, John R. Cavanaugh and Ross J. Cavanaugh.

## Motor Stocks Stronger

### General Motors, Chevrolet, Maxwell, Miller, Firestone and Chandler Higher

NEW YORK CITY, Nov. 21—Automobile and accessory issues yesterday closed with a steady demand and higher. With the interest of investors centered in copper stocks, it was only natural last week that demand for automobile and accessory stocks should have lagged. As a sequel to this recession there has been a rather sharp drop in their prices. Prices, yesterday, picked up considerably and investors and speculators netted substantial gains on the up market under the leadership of General Motors which has reached 600, just 90 points higher than last week. Firestone Tire common has also strengthened and has gone up 25 points to 1375. Maxwell common surprised investors last week by suddenly jumping 4½ points to 76 on strength of the declaration of an extra dividend. General Motors was probably strong on account of the director's meeting held to-day at which directors are to be elected and from which a financial statement will be forthcoming.

Automobile stocks were comparatively quiet during the early part of the week. United Motors after a show of firmness

eased off. There was a fairly good demand for Chalmers, which moved up about a point, but on realizing turned easier.

Powerful bear operations for several weeks have made two of the principal objects of their attacks Willys-Overland and Maxwell shares. The weakness in these issues has caused much selling. The short-selling interests, it is thought, have run their course, and the general decline in prices appears near a halt.

Pierce-Arrow preferred stock has been placed privately by the syndicate headed by J. & W. Seligman & Co. at 107 and the stock has all been sold. The New York Curb Market Assn. has listed 30,000 common shares and 15,000 first preferred shares, both of par value \$100 of the Manhattan Electrical Supply Co.

#### Paige-Detroit Increases Capital

DETROIT, MICH., Nov. 21—The Paige-Detroit Motor Car Co. has increased its capital stock from \$2,000,000 to \$3,500,000 by the addition of \$1,500,000 of 7 per cent cumulative preferred stock. The present capital consists wholly of common stock.

The new preferred stock is to be offered to the company's present stockholders at par and will have a par value of \$100. The purpose of the new issue is to provide the company with larger working capital and enable it to carry larger stocks of working material on hand.

### Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Week's Ch'ge
Ajax Rubber Co.	73½	74	..
J. I. Case T. M. Co. pfd.	86	86½	-1
Chalmers Motor Co. com.	130	150	..
Chalmers Motor Co. pfd.	110	115	-2
*Chandler Motor Car Co.	106	107	+3
Chevrolet Motor Co.	176	180	+3
Falls Motor	10	13	..
Fisher Body Corp.	38	41	..
Fisk Rubber Co. com.	80	95	..
Fisk Rubber Co. 1st pfd.	109	114	..
Fisk Rubber Co. 2d pfd.	95	105	..
Firestone Tire & Rubber Co. com.	1375	1390	+25
Firestone Tire & Rubber Co. pfd.	106	108	-½
*General Motors Co. com.	600	875	+90
*General Motors Co. pfd.	120	124	-2
*B. F. Goodrich Co. com.	70½	70½	+1½
*B. F. Goodrich Co. pfd.	113½	114	+½
Goodyear Tire & Rubber Co. com.	295	299	+1
Goodyear Tire & Rubber Co. pfd.	109	110	+¾
Grant Motor Car Corp.	7	10	..
Hupp Motor Car Corp. com.	4½	5½	..
Hupp Motor Car Corp. pfd.	85	100	..
International Motor Co. com.	5	6½	..
International Motor Co. pfd.	22	27	..
Keystone Tire & Rubber Co. com.	15½	16	..
Keystone Tire & Rubber Co. pfd.	15½	16	..
*Kelly-Springfield Tire Co. com.	77	78	+2½
*Kelly-Springfield Tire Co. 1st pfd.	96	100	..
*Lee Rubber & Tire Corp.	39½	40	..
*Maxwell Motor Co. com.	76	76½	+4½
*Maxwell Motor Co. 1st pfd.	81½	82	-¾
*Maxwell Motor Co. 2d pfd.	50	51½	+½
Miller Rubber Co. com.	250	260	+8
Miller Rubber Co. pfd.	106	108	+½
Mitchell Motors Co.	59	60½	..
Packard Motor Car Co. com.	..	170	..
Packard Motor Car Co. pfd.	94	98	..
National Auto Corp.	403½	41½	+¾
Paige-Detroit Motor Car Co.	38½	39½	+1½
Peerless Truck & Motor Corp.	23	25	+½
Pierce-Arrow M. C. Corp.	55½	56	+½
Portage Rubber Co. com.	165	167	..
Portage Rubber Co. pfd.	..	..	..
Regal Motor Car Co. pfd.	20	30	..
Reo Motor Car Co.	46	47	-¼
A. O. Smith Corp. com.	42½	43	-½
A. O. Smith Corp. pfd.	96½	97	..
Saxon Motor Car Corp.	78½	79	+2½

	Bid	Asked	Week's Ch'ge
Spicer Mfg. Co.	47½	48	+1½
Springfield Body Corp. com.	90	100	-3
Springfield Body Corp. pfd.	120	130	-5
Smith Motor Truck Co.	6¾	7	..
Standard Motor Construction Co.	7	8	..
Stewart Warner Speed Corp. com.	107	108	-2
Stewart Warner Speed Corp. pfd.	..	..	..
*Studebaker Corp. com.	124½	125	+1
*Studebaker Corp. pfd.	109½	110½	-3
Stutz Motor	65	65½	+¾
Swinehart Tire & Rubber Co.	86	90	-2
United Motors Corp.	62½	62½	+1½
*U. S. Rubber Co. com.	62	63½	+2½
*U. S. Rubber Co. pfd.	112½	113	+1½
White Motor Co.	54¾	54½	-½
Willys-Overland Co. com.	37½	38½	+¾
*Willys-Overland Co. pfd.	95	100	-5

\*At close Nov. 20, 1916. Listed New York Stock Exchange. †Ex-dividend. Quotations by John Burnham & Co.

#### OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS			
Auto Body Co.	44½	46	+2½
Chalmers Motor Co. com.	130	140	+4
Chalmers Motor Co. pfd.	110	115	+1
Continental Motor Co. com.	40	41	+¾
Continental Motor Co. pfd.	9½	10½	..
Ford Motor Co. of Canada.	290	305	-3
General Motors Co. com.	..	825	..
General Motors Co. pfd.	123	126	..
Maxwell Motor Co. com.	74½	77½	+½
Maxwell Motor Co. 1st pfd.	80½	83½	-1½
Maxwell Motor Co. 2d pfd.	49	51½	-1
Packard Motor Car Co. com.	172	180	+12
Packard Motor Car Co. pfd.	100	102	..
Paige-Detroit Motor Car Co.	38½	39½	+1½
W. K. Prudden Co.	49	50½	+2½
Reo Motor Car Co.	45½	46½	-¾
Studebaker Corp. com.	125	128	+2
Studebaker Corp. pfd.	108	..	+1
C. M. Hall Lamp Co.	..	31	..
INACTIVE STOCKS			
Atlas Drop Forge Co.	..	33	..
Kelsey Wheel Co.	55	60	..
Regal Motor Car Co. pfd.	25	..	+5

## Overland Brings Out Sport Car

### Four-Passenger Country Club Roadster To Be Mounted on 75-B Chassis

TOLEDO, Nov. 21—The Willys-Overland Co. is now making deliveries of a new sport car which it has named the Country Club model. It is a four-passenger roadster embodying many unusual designs and constructed over the chassis used for the model seventy-five B., and sells for \$695 f. o. b. Toledo.

The car is furnished with a rich gray body, with long grained upholstery and mohair top to match and has black fenders and trimmings, and red wire wheels. The two front seats are convertible and move independently forward and back to lengths suitable for the driver and his companion. The doors are of a wide Z shape and front hinged with pockets for tools and accessories. Rear seats for two are close up, but allow ample leg room for the occupants, so that four adults may ride comfortably in the car. Cantilever springs and special springs under the cushions provide for smooth and easy riding. The motor is a four-cylinder en bloc type with a 3 3/4-in. bore and a 5-in. stroke. Ignition is created by the battery and distributor system and the Tillotson carburetor receives the fuel by vacuum feed. A 12 1/2-gal. gasoline tank is situated under the rear dash. The car has a wheelbase of 104 in. and includes in its equipment an extra wire wheel and a spare tire bracket.

### Paterson Adds "Chummy" Roadster

FLINT, MICH., Nov. 20—The W. A. Paterson Co. will have a single-chassis model for 1917 carrying two bodies, one a regular touring model and the other a newly designed "chummy" roadster. The touring model has a new body with a double cowl, and it is somewhat longer and wider. The "chummy" roadster is mounted on the same chassis, having a wheelbase of 117 in., and its capacity is four passengers.

### Fight Attempt to Increase New York Truck Fees

ALBANY, N. Y., Nov. 21—The commission for creating a higher schedule of fees for motor omnibuses and motor trucks in New York State held its first public hearing in the Capitol to-day. The commission has not made public any of its recommendations as yet and the hearing here to-day was for the purpose of enabling it to obtain first-hand information and suggestions from owners and operators of motor trucks.

The commission consists of Edwin

Duffey, Highway Commissioner; W. W. Wotherspoon, Superintendent of Public Works, and Frank M. Williams, State Engineer. It was formed by the last legislature to scientifically determine a new schedule of registration fees for motor trucks and omnibuses, such schedules being based on the time and extent of use, and wear and tear of public highways by such vehicles.

From the arguments presented by Charles Thaddeus Terry, representing the N. A. A. C. and the Automobile Trade Assn. of New York; Roderick Stephens, George H. Pride, Oscar W. Shadbolt and A. F. Masury of the Motor Truck Club of America, and others, it was brought out that as the State only has jurisdiction over State roads and not city, county or village roads, any fees based on the wear of public roads meant State roads and that these fees could only be placed on those trucks using State roads.

### Empire Inclosed Car Ready Dec. 1

INDIANAPOLIS, IND., Nov. 20—The Empire Automobile Co. has entered the field of inclosed cars with a sedan which will be ready for delivery Dec. 1. It is a convertible inclosed type with two doors, one on each side midway of the body so that the front seats are reached by an aisle way. The upholstery is gray and black Bedford. Two cellarettes or small package compartments are behind the rear seat cushion. The body is mounted on the six-cylinder 120-in. wheelbase chassis.

### Ball & Ball Co. Incorporates

DETROIT, MICH., Nov. 21—The Ball & Ball Carburetor Co. has incorporated for \$20,000. Incorporators are F. H. Ball, F. O. Ball and Kate D. Ball. The concern was formerly a partnership of father and son and has been made into a corporation because of the entrance of a brother as a partner. The company sells all of its product through the Penberthy Injector Co.

### \$412,812 Awarded to H. S. Chapman

CLEVELAND, Nov. 21—An award of \$375,000 and interest, amounting to a total of \$412,812, has been made by jury here to Henry S. Chapman in his suit for \$800,000 alleged to be due him from the Peerless Motor Car Co. Mr. Chapman, who had no previous connection with the automobile industry, claimed the violation of a contract under which he went to London to sell motor trucks to the British war department.

### Gillam Co. Plans Capital Increase

CANTON, OHIO, Nov. 22—The Gillam Mfg. Co. will increase its capital Nov. 28 from \$350,000 to \$450,000 for the purpose of extending its factory. The Gillam company manufactures materials for Packard, Maxwell, Overland, Haynes and Oakland.

## Springfield Body Sues Fisher

### Charges Infringement of Two Design Patents Covering Two of Its Body Types

NEW YORK CITY, Nov. 21—The Springfield Body Corp. and the Springfield Body Co. have brought suit against the Fisher Body Corp., the Fisher Body companies and F. J. Fisher and A. Mendelson, the latter controlling interests in the Fisher Body interests, charging infringement of design patents No. 47,252 and 47,630, covering the Springfield type convertible and four-door bodies, respectively. Charges of unfair competition are also brought against the defendants, who are sued individually and collectively. Under its patents the Springfield corporation claims exclusive right to produce and market bodies of these types, and alleges that the defendants have incorporated elements of the designs covered by these patents in their product.

The Fisher Body Corp. will contest the claims of the Springfield interests, President F. J. Fisher stating, "We have been advised by the best patent counsel we can get, and they have confirmed our absolute belief that there is no infringement whatsoever. Had we ever thought we were infringing, we certainly would have abandoned that line of business, as it does not constitute over 2 per cent of our entire business."

Last February the Springfield Body Corp. of New York was formed, controlling the Springfield body patents. Since then the following twenty-three companies have taken licenses to manufacture the same on a royalty basis:

Chas. Albrecht Co.	Milwaukee, Wis.
Hume Carriage Co.	Boston, Mass.
M. Armstrong Co.	New Haven, Conn.
Millsbaugh & Irish	Indianapolis, Ind.
Blue Ribbon & Carriage Co.	Bridgeport, Conn.
J. W. Mount Co.	Red Bank, N. J.
Cadillac Motor Car Co.	Detroit, Mich.
Stayer Motor Car Co.	Chicago, Ill.
R. N. Collins, V. W. Co.	St. Louis, Mo.
Glascok Mfg. Co.	Muncie, Ind.
Hale & Kilburn Co.	Philadelphia, Pa.
Alexander Wolfington's Son	Philadelphia, Pa.
Portland Body Works	Portland, Ind.
Central Mfg. Co.	Connersville, Ind.
Racine Mfg. Co.	Racine, Wis.
Chas. S. Gaffery Co.	Camden, N. J.
W. S. Seaman Co.	Milwaukee, Wis.
Chicago Coach & Carriage Co.	Chicago, Ill.
E. J. Thompson Co.	Pittsburgh, Pa.
FitzGibbon & Crisp	Trenton, N. J.
Victor Mfg. Co.	Detroit, Mich.
Walker-Wells Co.	Amesbury, Mass.
Willys-Overland Co.	Toledo, Ohio

Among the automobile companies which are now incorporating Springfield type bodies in their regular output are: Apperson, Abbott-Detroit, Cadillac, Chandler, Cole, Davis, Haynes, Interstate, Jordan, King, Marmon, Mitchell, National, Oldsmobile, Overland, Paige-Detroit, Premier, Reo, Standard, Stearns-Knight, Studebaker, Velie, Westcott, Winton and Willys-Knight.



## N. A. A. A. J. Meets in Boston

### Final Session in New York—Action Routine Matters

BOSTON, MASS., Nov. 21—*Special Telegram*—The Ways and Means Committee of the National Assn. of Automobile Accessory Jobbers opened session to-day. The meeting will be continued to-morrow and final session will be held at the Hotel Astor in New York on Thursday. Only routine matters are being taken up and final action on the suggestions of the committee will be deferred until the meeting beginning Jan. 10. To-day's session was exclusively for members of the committee, the gathering being called by W. M. Webster. To-morrow there will be an open meeting at which New England jobber members and jobbers who are not members will attend. Non-members will be invited to join the association. Those in attendance to-day are W. K. Norris, McQuay-Norris Mfg. Co.; Wm. Sparks, Sparks-Withington Co.; S. B. Dean, Nichols, Dean & Gregg; F. B. Caswell, Champion Spark Plug Co.; George W. Shafer, W. E. Pruden Hardware Co.; W. W. Lowe, Electric Appliance Co.; Mr. Moody, Boston, and W. M. Webster.

### Inter-State Sues Rutenber

DETROIT, MICH., Nov. 20—The Inter-State Motor Co. has started suit for \$700,000 against the Rutenber Motor Co., charging breach of contract. It is alleged that 3000 motors contracted for caused the purchase of \$2,000,000 worth of parts and the booking of orders for 5000 cars, and the Interstate company alleges that only 379 motors were delivered.

### Brush Analyzes Crankshaft Balance Before Indiana S. A. E.

INDIANAPOLIS, Nov. 21—At a meeting of the Indiana section of the S. A. E. held here last night, A. P. Brush read a paper which was really a continuation of the one he presented at the summer meeting of the Society. Starting where the former paper ended, Brush pointed out that there are two sorts of engine vibration; that due to reciprocating and other unbalanced forces which tend to move the engine as a whole, and those which tend to oscillate internal parts without affecting the whole mass directly. In the latter class come crankshaft deformations, whether caused by bending or torsional stress.

Brush drew attention to the fact that the crankshafts of four- and eight-cylinder engines need counterbalance masses much more than do six throw

shafts, and he expressed a doubt as to whether a large size of shaft was not a better solution of the vibration problem than a balanced shaft, except for four throw shafts where bending is a more important question than torsional deformation. He placed special stress on the fact that balancing a shaft does not affect the loads on any crankpin bearings or on the small end connecting rod bearings, it merely prevents vibration and lessens the load on the main bearings.

The paper was illustrated with diagrams showing the forces within an engine and Brush concluded it by a plea for his patented system of lubrication described in the summer meeting paper.

### Brooks with Madison Motors

DETROIT, MICH., Nov. 21—H. H. Brooks has been appointed superintendent of agencies for the Madison Motors Corp. Mr. Brooks was formerly sales and advertising manager for the Pontiac Chassis Co.

### General Motors Builds Plant

DETROIT, MICH., Nov. 21—The General Motors Co. is erecting a one-story factory 734 by 200 ft. The building will be used for the manufacture of motors for use of affiliated companies of the General Motors, the output of the Northway Motor & Mfg. Co. having proved insufficient.

The site was originally planned for use for the Cadillac company's new plant, but different arrangements followed the purchase of another site last week by the Cadillac company.

### Livingston Shell-and-Hood Patent Upheld

NEW YORK CITY, Nov. 21—In a decision handed down here yesterday, the Livingston patent No. 1,156,017 covering a mask for concealing the engine and radiator casing of a car was held valid and infringed by the Lawco radiator shell and hood made by the F. H. Lawson Co., Cincinnati, Ohio. The construction covered by the patent comprises a motor hood section and a separate removable radiator hood section, the assembly having streamline tendencies when mounted on a car.

The suit was brought by D. McRa Livingston and his licensee the Ospeco Mfg. Co. against the Lowe Motor Supplies Co., charging that the Lawco device sold by the Lowe Company and manufactured by the Lawson concern infringed the Livingston patent. Judge Sheppard commented that no wilful infringement was evident but that the Lawco construction was so similar to that specified in the patent that he could only hold the latter infringed. The suit was in the U. S. district court for the southern district of New York.

## Synthetic Resins Discussed

### Dr. Baekeland Lectures Before Detroit Chemical Society on Bakelite

DETROIT, MICH., Nov. 17—Dr. L. H. Baekeland, president of the General Bakelite Co. and a member in an advisory capacity of the Hooker Electric Chemical Co. of Niagara Falls, lectured last night on the subject of "Synthetic Resins" before a joint meeting of the Detroit Chemical Society and the Detroit Engineering Society at the club rooms of the latter organization.

He told of the application of synthetic resins in electrical and automobile engineering, stating that bakelite is a concentrated product of formaldehyde and carbolic acid, and that only one special condition can be present when it is formed, and that when this condition is not present anything but bakelite will be the result, and added that instead of using phenol, its homologues, cresols, other phenolic bodies and various substances having the same functions may be utilized.

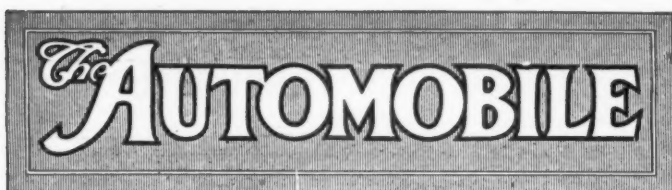
"It should be well understood," said Dr. Baekeland, "that formaldehyde in reacting about phenol does not necessarily give bakelite. Quite to the contrary. It is only under very special conditions, now well established by public research, that this substance can be obtained. When formaldehyde is left to react on phenol under ordinary conditions, almost anything may happen but the formation of bakelite. In some cases a resinol material is formed, but it has no especially new properties and is similar to cheap natural resinol."

### 500 S. A. E. Banquet Tickets Sold

NEW YORK CITY, Nov. 20—The number of tickets for the annual banquet of the Society of Automobile Engineers on Jan. 11 at the Hotel Biltmore is becoming scarcer each day. Fifty tickets have been sold since last week, bringing the total sale up to 500. Capacity is 750.

### Stutz Wins Phoenix Race

PHOENIX, ARIZ., Nov. 18.—R. H. Delno, of Tucson, driving a Stutz, won the 100-mile free-for-all race at the Arizona State Fair here to-day, in 1 hr., 43 min. and 12 sec. E. F. Bennett, of Silver City, N. M., and also driving a Stutz, won second money in 1:45:01. A. Gladney, driving an Overland entered by the Arizona Overland Co. of Phoenix, was third in 1:45:10. Tom Brewer, of Globe, Ariz., driving a Marmon, finished fourth in 1:46:20. C. G. Miller, driving a National, finished fifth in 1:48:56 2/5.



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Horace M. Swetland, President  
W. I. Ralph, Vice-President E. M. Corey, Treasurer  
A. B. Swetland, General Manager  
T. B. Van Alstyne, Advertising Manager  
231-241 West 39th Street, New York City

#### EDITORIAL

David Beecroft, Directing Editor  
Donald McLeod Lay A. Ludlow Clayden Sydney Oxberry  
J. Edward Schipper, Special Representative, Detroit

#### BRANCH OFFICES

Chicago—Mallers Bldg., 59 East Madison St., Phone Randolph 6960  
Detroit—95 Fort Street, West, Phone Main 1351  
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Cable Address ----- Autoland, New York  
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## International Competition

THE uniting of different concerns in the same industry for promoting the use of U. S. A. goods abroad will unquestionably have to be resorted to when war days are over and all Europe takes up anew the various channels of export trade which it held previous to the war but has been forced to relinquish during the war. Such co-operation of firms in the same industry is in export circles known as international competition, a term new to many exporters in our industry.

It is only natural that those countries that have been forced to drop export trade temporarily during the war will enter the field with renewed efforts as soon as peace is declared. The war is believed by many to be almost entirely a trade war. If it is worth while these European nations expending so many billions fighting for trade privileges, it is a correct conclusion to draw that they will fight with equal vigor in trade circles to win back what has been lost.

While some export authorities contend that European nations will be so exhausted after the war that they cannot take up with vigor the export work, the general feeling is otherwise. Why fight so strenuous and costly a war for trade only to be so weak when the fray ends that you cannot take advantage of what you have been fighting for? All the energies of these countries will be thrown into foreign trade. They will only be losing their remaining

business life blood if they let the thing go unchallenged that they have been fighting for.

After the war international competition will be many times more intense than before the war seems but a natural conclusion. Travelers from foreign lands constantly report that when fighting is over the buyers will turn to European countries for their goods, where they have been buying them for over a generation and, in some cases, for three generations.

Europe is many times better organized to-day than before the war. While human loss has worked a handicap, remaining resources have been so superiorly organized as to largely make up for the loss in labor. Factories have been doubled and often trebled; modern production methods have been installed, and Europe has grown in 30 months more than in 30 years of peace.

## The Year in Tires

THE tire industry is keeping step with the automobile industry in production, and its experimental departments are as busy as the engineering departments of the automobile factories in improving quality and methods for increasing production. Many of our large tire concerns merit congratulation for the wide-gage policy of research they are carrying on. It is solely due to such work that tire quality has been on the increase, and the amazing results given in racing tires of the season just closing is good proof of what has been accomplished in improving the chemistry of tires.

A new movement and one that gives promise of good results is that of building a better-balanced tire, one with a fifty-fifty relationship between carcass and tread when wear is the criterion. The heavy rubber tread is useless if the carcass is not built to give approximately the same service. There is no economy in a tire with a 10,000-mile tread and a 3000-mile carcass. The ideal tire is one with a carcass so balanced in strength and endurance to give the same wear as the tread. In solving this, tire-makers have carried on a world-wide campaign of investigation. Used tires from all fields of service have been collected and experimental departments are doing all possible to arrive at the proper amount of carcass to go with the proper amount of tread and vice versa.

Tire-makers have not made as much progress as desired in reducing the number of standard tire sizes. Each year sees a wider effort to reduce the number of so-called standard sizes and also to reduce the number of so-called oversizes. The end is not yet in either case. The work has not gone forward so well as that of standardizing many parts entering into the chassis. The introduction of cord tires is greatly increasing the number of sizes, and with the field split between Q. D. clinchers and straight-side types the number of sizes to be carried is still far too large. The argument between straight-side and clincher will eventually solve itself, but a good getting together of tire makers might end it in a single year and thus make the selling of tires much easier.



# The Tire Industry

- ¶ Increased manufacturing facilities the great spotlight of the year—Tire production keeps pace with automobile production.
- ¶ Cord tires now being produced in quantity by several concerns.
- ¶ The balanced tires now aimed at by tire makers.
- ¶ Fabric cost has increased 100 per cent—chemicals also are more expensive—crude rubber has been plentiful.
- ¶ Greater use of non-skid types.
- ¶ Tire companies are leaders in welfare work among employees.

**H**ISTORY will record 1916 as being a banner year in the tire industry. Every tire factory is literally swamped with business. Output figures have increased from 50 per cent among the large producers up to 2000 per cent with some of the smaller over 1915. Factories are being built almost universally by existing tire concerns to add to their present facilities and large new concerns are entering the business on a heavy scale.

Millions of dollars' worth of new machinery has been bought to supply the hundreds of acres of increased floor space. Manufacturing schedules that reach into the millions are planned by the larger concerns, and even with this great output they are straining every resource to catch up with demand by improving methods and adding space and machinery.

With this increase in business, quality has also gone up. More secrets have been learned in the laboratories and employed with benefit to the quality of the product. Better mileage figures are being obtained by users. The difficulties of the last year in the crude rubber market have been cleared away and now no difficulties are found in obtaining the raw material.

## Prices Have Not Risen

In spite of advances of 100 per cent in the prices of fabric, of increased cost in almost every item of material and manufacture, prices to the consumer have not risen. Better tires for the same money, in spite of the increased costs, tells the story of increased efficiency in factory methods and the benefit of quantity production. Several well-defined trends are apparent, and these form an interesting story of development.

## Cord Tires a Growing Issue

Cord tires are a growing issue of the year in the industry. Although more expensive than the fabric, they are being used all over the country and are recognized as a desirable part of regular automobile equipment. This tendency is expected to grow, until, it is the belief among tire manufacturers, it will strike to about the \$1,800 level in cars. While only two or three concerns are marketing the cord type in quantity, there are several companies experimenting with it, and it will not be surprising to have many different makes on the market during the next year.

Naturally the reason for the cord tire is its greater resiliency, longer life, possibility of standing lower inflation

pressure without damage, and in general, aiding in the production of that very desirable goal always in the eye of the tire builder, the balanced tire.

Cord tires are in two general classes. There is the cable tread, such as is used in the Silvertown cords, and the thread system, such as is used in the Goodyear. The names are suggestive of the basic differences. The cable system is a card carcass built up of multi-strand cables, which have rubber cores. The thread system has the cords in the form of a fabric, for convenience in manufacture. The cords are held in place by a few very fine cross threads, which break when the tire is used, this leaving only the cords.

## The Balanced Tire

By the balanced tire is meant one which maintains an even balance between carcass and tread. Samples of used tires that have failed are gathered from all parts of the world by the important tire builders, and the reasons for failure are gone into. If the carcass has perished through normal wear, and yet there remains a considerable amount of tread rubber has not been worn away, the tire is not balanced. The two should be exhausted at the same time, or nearly so, and the time-worn example of the one-horse shay represents the cynosure of the tire developer, the world over.

When it is stated that this year's tires are better balanced than previously, it means much to the manufacturer, and it also bears a very natural profit for the user, because the saving which the balance means to the manufacturer is reflected in lower cost of materials and finally in reduced price possibilities.

The reason that the cord tire is generally a superior article in the way of balance is that the carcass is the limiting factor and the cord tire is capable of withstanding a great amount of flexure in the side wall. Tire carcasses fail under flexure because in bending the side wall one part is put under compression, while the other is in tension. This tends to cause a split along the neutral axis. With the cord type the entire carcass is more of a single unit, which resists to a maximum degree any tendency toward separation of the plies.

No one in the tire world sees any prospect of cord tires prices being down around the level of fabric prices for years. In fact, unless some revolutionary method of manufacture is developed, which is not yet in sight, this state of affairs will not be altered. It is a question whether or not the cord tire

is cheaper on a per mile basis for the user. It certainly will stand a maximum amount of neglect and a lower inflation.

### Two Methods of Curing

There are two general methods of curing tires; one is where the entire product is cured at once, which is known as the single cure, and the other in which the carcass is first given a partial cure, the tread then added, and the entire casing then cured together. This is the double-cure process. Both these are used extensively and there has not been any gain by either method during the year.

### Straight Side vs. Clincher

Another great point is the controversy of straight side versus clincher. The clincher tire is favored abroad, and for that reason American export products have to be made in this style. For domestic trade the straight side is growing rapidly, and if Ford sizes are excluded, it is probable that the percentage of straight side, as compared with clincher, is about 75 to 25. The soft-bead clincher is rarely seen above the 3½-in. size. The Q. D. clincher, or non-extensible bead type, is seen in the larger sizes, but, as compared with the straight side the percentage is dropping annually.

The criticism leveled against the straight side on the safety basis does not seem to have justified itself in the light of development. For example, Goodyear is making straight side tires in 6, 7, 8 and 9-in. sizes, which have 100 per cent perfect record as regards resistance against fastening failure. As a manufacturing proposition, the straight side is on a par with the clincher.

### The Compounding Work

One of the points which the public does not appreciate in tire manufacture is the work of the compounding room. It is here that the secrets of chemistry are studied for the purpose of improving the compounds used for various parts of the tire. A mistake in the compounding room would cost 6 months in production if it were a serious one, and naturally conservatism and care are the watchwords of the tire laboratory.

Considerable talk has been going around regarding tread colors, but the gist of the entire matter seems to be that the compounding room can furnish about any color desired, and at the same time have about the same degree of toughness. It is quite certain that the black tread is very popular just about now, and taken in conjunction with the red side wall this gives a very attractive appearing tire, which is used by many of the large manufacturers. The important result from the car drivers' standpoint is that improvements in compounding during the year have given a tougher tire tread for the same price. Truck tires, too, are better because of superior compounding methods.

In the pro and con arguments for and against the straight side type, the majority on the side of the straight side seems to sum up its arguments under four main heads.

First, the line of weakness just above the bead in a clincher tire is eliminated in the straight side, or to put it in other words, rim cutting is reduced.

Second—The straight side tire has a broader base, and is, therefore, a more stable mechanical proposition; there is less tendency for the tire to roll off the rim, although it is doubted if this were ever noticed to any great extent even in the clincher type. This broader base is included in the argument that better disposition is made of the air space with the straight side tire. There is greater air space.

Third—The radius of flexure at the rim is large. This naturally is a factor in prolonging tire life, as the smaller the radius of flexure the more severe are the stresses which tend to separate the fabric plies and hence cause the tire to disintegrate.

Fourth—The continuous non-extensible bead. This is made up generally of a core of piano wire. In some instances the piano wire is braided to give it even a stronger assembly. This piano wire binder running continuously around the bead gives the non-extensible feature, which can be employed in the straight side tire, but which, of course, is out of the question in a soft bead tire, which must be stretched over the rim, although used in a Q-D clincher.

### 1916 a Wonderful Year

All told, 1916 has been a wonderful year in the tire business. On every hand business is reported increased by great percentages. Firestone output increased 62 per cent. during the year. The output of Goodyear has increased 85 per cent; Goodrich has increased 40 per cent; Miller Rubber Co. reports approximate increase of 150 per cent; in the New Jersey district Ajax, Michelin, Endurance, Carspring, Howe, Thermoid and Braender have felt the reaction from the greatly increased production of automobiles, and the last-named concern alone reports an output increase of 200 per cent. Besides the unprecedented demand, the advantage of excellent crude rubber market conditions has prevailed, and although every item of manufacture has increased in cost from 20 to 300 per cent, according to one concern, and varying percentages according to others, the increased production has largely overcome the increased cost.

To meet the increased demands, acres of floor space have had to be added, and more efficient machinery substituted. There is not a concern which has not felt the necessity for increasing its floor space, machinery, labor or output facilities. Some of the increases in area are interesting. Firestone has added 11 acres, Goodrich 21 acres, General Tire & Rubber has large areas now under process of building, Braender has added 10,000 sq. ft. The story of the Jersey company is the same. Michelin, Thermoid, DeLion, Acme, Ajax, and all the others in the scattered tire territory throughout the entire United States have shown the reflection of the demand for increased production. Other examples showing the general growth throughout the country are an increase in output of the Gorden Tire Co., which increased its output 50 per cent, and added 3000 sq. ft. of floor space. The Gibson Co., Indianapolis, increased 125 per cent; the Alliance Co., Alliance, Ohio, 50 per cent; the Acme Rubber of Trenton 25 per cent.

### The Multiple Calendering Process

In adding new machinery it is quite natural that a number of manufacturing processes would be improved by the use of more modern machinery. One of the points in which manufacturing has been conspicuously improved is in the multiple calendering process. In making the fabric for the fabric tires a roll of the fabric is run through the calender and another roll of rubber passes through and impregnates the fabric with the rubber. It is then reversed and impregnated from the other side after which it is run through rolls again and a surface coat of rubber applied to it. With the old method, it was necessary to run the roll of fabric through the machine three times, once for each impregnation and again for the coating. With the new method a train of three calenders, placed one after the other, allows the material to be fed continuously from one to the next so that by the time it has passed through all three it has been given the two impregnations from the first two machines and the coating from the third. This avoids two shutting down processes between each roll of fabric and avoids two restarting actions in again circulating the fabric through the calenders.

### Less Reclaimed Rubber

With the advantageous crude market a less percentage of reclaimed rubber is finding its way into tires and the number of low grade tires manufactured is decreasing in proportion to the total. Also during the year there have been a great



many outlets which have sprung into being for the lower grades of tough rubber stock. These are not necessarily poor grades of rubber but are not of the same quality as is necessary for pneumatic and solid tire use. A good example is in the rubber soles of shoes. This white rubber compound has increased remarkably and a great many of the concerns manufacturing tires turn their attention to this field also.

#### Fabric Cost Doubles

Fabric cost has doubled during the year. Firestone reports a 100 per cent increase and others very much the same. It must be remembered in thinking of the increase in fabric prices that the cord prices have kept pace with them, so that on the whole it can be stated that cord tires are 20 to 30 per cent more expensive than the fabric type. The chemicals used in the compounding room have gone up in price, but even taking this into consideration the improvements are very noticeable in this department of the work. It is difficult to obtain access to the compounding room of a rubber factory, but there have been rumors which are quite well substantiated that several chemicals which were hitherto deemed impractical for rubber compounding work have been found available. The result has been particularly noticed in toughness and ability to resist abrasion.

Firestone has embarked in the cord tire field and is turning out daily 500 of this type. The daily production of the fabric tire is 12,000. These are all machine-made and during the year \$1,500,000 has been spent in machinery. Like other companies, Firestone reports the crude market to be satisfactory and in the manufacture of tires the percentage of 70 per cent plantation against 30 per cent wild rubber is

used. As one of the leading tire organizations the indorsement of this concern of the black tread tire with the red side wall has helped in putting this development among the foremost trends of the year. The non-skid tire made by this concern is well known on account of the printing of the word Non-Skid across the tread on the fabric tire. On the cord tires the double F non-skid tread is used.

Goodrich is producing about 20,000 tires a day. All of these are, practically speaking, manufactured by machinery and during the year a great amount of money has been expended on this part of the equipment. The testing department has been given special attention in the development program.

#### Non-Skid Types Gain

Owing to the growing practice of car manufacturers in equipping the rear wheels of their product with non-skid tires the percentage of the total output in non-skids is increasing in all plants. During the year 1916 75 per cent of Firestone tires were non-skids. The price of these to the user is 12½ per cent higher than the plain tread, while the price of the cords is approximately 25 per cent higher. About 25 per cent of the output is straight side.

In securing the supply of crude, 60 per cent comes from the East Indies, about 30 per cent from Brazil and the remainder from scattered territories. Although minor structural changes have been made to improve the product, there have been no radical changes in design of either the fabric or the Silvertown cords. The most important improvement is the addition of straight side tires in the Silvertown cord models, thus completing the line.

## Tire Companies Increase Activity

PRACTICALLY no change appears in the Michelin line this year. The company's newest model was brought out only about a year ago, this being the Universal non-skid casing which is made with both clincher and straight side bead. Additions to the factory have been going up throughout the year and a large three-story building has been started which will nearly double the capacity of the plant. Lack of manufacturing facilities has proved a considerable handicap to the company during the past year, and great difficulty was experienced in securing molds. The latter problem was solved by the Michelin company making its own molds, so that it now has a complete line, including the popular 30 by 3½ size. In the tube department a unique installation is the circular mold upon which the red rubber inner tubes are made. This conforms to the shape of the tire casing, and the company claims that the tube is thus in normal shape when inflated.

#### Woodworth Has New Tread

A new non-skid with diagonal depressions each side of the center of the tread has been adopted by the Leather Tire Goods Co., Niagara Falls, N. Y., maker of Woodworth Trouble-proof tires. This design replaces the non-skid in which circular depressions were used. The feature of this tire, which is also made with plain tread, is that there is a strip of leather surrounding the casing of the tire and under the tread. It is designed to be puncture and blow-out proof, and is guaranteed for 5000 miles. The leather is chrome tanned and specially prepared so that it will not interfere with the resiliency nor cause heating or other difficulties. Its purpose is to add materially to the strength of the tire. About 55 per cent of the production is non-skid tires and the rest are plain tread. Non-skids are more popular in the North and plain tread in the South. About 27 per cent have straight sides, 8 per cent Q. D. and 65 per cent clincher.

Straight-side tire business has increased about 20 per cent. Trouble-proof tubes are also built, and are made of several plies of rubber with the grain of alternate plies running crosswise so that the tube has equal strength in both directions.

#### Carspring Increases Mileage Guarantee

The Carspring tire, made by the New Jersey Car Spring & Rubber Co., Jersey City, N. J., is improved in detail with the result that the guarantee has been increased from 3500 to 5000 miles. It is made both as a non-skid and plain tread and red tubes are manufactured. Sixty per cent of the casing production is non-skid and 80 per cent of the casings, with the exception of the Ford size, are straight side. Cord tires are not manufactured.

#### Republic Favors Black Tread

As a good example of the proportion of non-skid to plain tread, Republic makes 75 per cent of the total output non-skids. They are made with black tread only and a distinct advantage is claimed for this tread stock. The tires are machine made. Another Republic feature is the long guarantee basis, 5000 miles. This concern verifies the straight side trend, stating that it sells best up to the 4½-in. size. This is significant in view of the tendency toward straight sides even in tires of larger section and shows that everyone is not as yet satisfied that the straight side tire is best in the larger sizes.

#### Kelly-Springfield Specializes on Non-Skid

Kelly-Springfield tires are 80 per cent non-skid. It is a single-cure tire and reflects the straight side tendency, as about 75 per cent are made in this style. Kelly-Springfield adjustments are made on a 6000-mile basis on the non-skid and 5000 mile on plain treads. There are two plants,

one at Akron and one at Wooster, Ohio, the latter making Ford sizes only. The present plant has grown about to its capacity and the company has recently purchased land at Cumberland, Md., where a new factory will be erected.

#### **Pennsylvania Makes Many Straight-Side**

Three styles of Pennsylvania non-skid tread are marketed, each with a different mileage guarantee. The Vacuum Cup has 6000, the Ebony tread 5000, and the Bar Circle 4000. All three are the same in materials, but differ in the tread shape and thickness. They are all single cured. The experience of the Pennsylvania concern bears out the statement that 75 per cent of all tires for 1916 exclusive of the Ford size are straight side. The Pennsylvania tire is sold principally to dealers and hence the percentage of straight side output is significant of current demand.

#### **Redwall Now Made on Full Mold**

The National Rubber Co., Pottstown, Pa., which makes the Speedway Redwall tires, has changed from the wrapped tread to the full mold process. It claims that the full mold tire has a greater density and resistance than the wrapped method due to the higher pressure during vulcanization. To be specific, wrapped tread tires are cured at a pressure of from 750 to 900 lb., whereas the full mold tire is cured at 2250 to 2500 lb. per square inch. The entire National output is fabric tires, all being hand made. This concern is growing rapidly, the factory output having increased approximately 2000 per cent during the year. In area this amounts to about 60,000 sq. ft., and during next year 70,000 sq. ft. additional is contemplated.

#### **Thermoid Specializes on Fabric Tires**

Thermoid is specializing on fabric tires and does not contemplate the manufacture of the cord type. The company does not make any clincher tires above 32 by 3½. Both hand and machine work are used, with the machine generally on the small sizes and the hand methods on the large. On the other hand, there are several Jersey concerns which are preparing to manufacture cord types.

#### **Fisk Factory Covers 29 Acres**

Fisk tires have been slightly refined, but in the main are the same as heretofore. Non-skid pneumatics are manufactured under the trade name of Red Top, and there is also a gray non-skid. Gray smooth-tread tires are also produced. Production has been increased about 25 per cent during the year, the factory additions including a large mill building, storehouse and seven-story administration building, bringing the total floor area of the plant at Chicopee Falls to 29 acres. New machinery to the value of \$425,000 has been installed during the year.

#### **Combination Features Hold-On Tread**

The Combination Rubber Mfg. Co., Bloomfield, N. J., reports the production of 130,000 tires and 145,000 tubes during the year. The Hold-On tread, a depressed type of non-skid, accounted for 90 per cent of the production; 40 per cent of the tires are straight side and the manufacture of tubes is almost equally divided between gray and red, the latter being an antimony-cured, hand-made product. All tires are wrapped tread. It is not expected that there will be any appreciable advance in the prices of the product, inasmuch as the company is protected by favorable contracts on fabric and rubber.

#### **Braender's Many Improvements**

Braender is not making any cord tires and the percentage of fabric tires manufactured by machinery is about equal to that manufactured by hand.

During the year the improvements in Braender tire manufacture run through the entire gamut of treads in tire design.

A tougher tread, a better balanced product, improved fabric weave, improvements in calendering and greater strength in friction and cushion rubber are among the principal points where progress has been made. In addition, there is now special waterproofing on the inside of the tire to prevent water from getting into the fabric. The new form of breaker strip of heavier construction and basket weave increases the number of rubber rivets which hold the tread to the fabric and gives an extra tough construction which resists the danger of tread stripping. In the Braender, as well as in many other tires, the side walls have been made tougher to protect the carcass from ruts and sandy roads.

#### **Quaker City Features Clinchers**

Quaker City is now producing a single cure non-skid tire. About 75 per cent of the output is in clincher sizes. Factory buildings have been greatly increased and production accordingly put up during the year.

#### **Converse Triple Tread**

The triple tread made by the Converse Rubber Shoe Co. of Malden, Mass., is guaranteed for 6000 miles and is made in any of the popular sizes. The triple tread tires are cured by the unit wrapped method with a single cure.

The Endurance Rubber Co. manufactures all non-skids. The Rubber Insulated Metals Corp., making the Century tire, makes 75 per cent non-skids.

Guarantees vary with the different policies and with different constructions. A few of these have been mentioned varying all the way from 3000 to 6000 miles, but it cannot always be said that the guarantee gives any valuation of the data on the value of the tire. The purchaser may be spending a certain percentage of his money for guarantee and the rest for tire, which would depend on the quality of the product and its life.

#### **Ajax Uses Single Cure**

Ajax uses the single-cure process for its entire output and is producing 1700 to 1800 tires a day. It is adding new space. A significant point in relation to the straight side question is that Ajax states that 75 per cent of its business outside of the Ford sizes is straight side.

#### **Empire Makes Cord Tires**

Empire has its cord tire on the market and expects that this type will form a considerable percentage of the 1000-a-day output. Of the Empire output 60 per cent are straight side and the percentage is increasing.

#### **Lee Has Armor-Plated Type**

Another concern which has more than one style of non-skid tread is the Lee Tire & Rubber Co., which makes a puncture-proof style with metal disks forming an armor plate in the carcass beneath the tread. There is a plain rubber non-skid without the metal disks. One of the improvements is that the side cover strip is continuous and integral with the tread.

#### **Acme, Delion and Globe Wrap Treads**

Both the wrapped and molded tread are produced by Acme also, while Delion and Empire have one method solely. Delion uses all single-cure, wrapped-tread, while Empire has single-cure molded. Another concern which produces only the wrapped tread is the Globe Rubber Tire Mfg. Co. Here the single-cure process is used and some of the tires are made by hand and some by machine.

#### **Rutherford Makes Black Ribbed Tread**

The popularity of the black ribbed tread which made its appearance coincidentally with the cord tire has caused some concerns to outfit their plants to produce a tread of this sort for fabric tires. This tread is faster than a great many of



the plain treads and is also of good appearance. One of the treads brought out along these lines has been put on the market by the Rutherford Rubber Co., under the name of Sterling. The red side wall which has proved popular is also used.

#### Miller May Make Cord Tire

Although no definite information is available regarding the intentions of the Miller Rubber Co. on cord tires, it is probable that early announcements will be made. This concern features a non-skid known as the Geared-to-the-Road tread. The straight side business has increased and at the present time 33 per cent of the total output is devoted to this type. This concern will have turned out 300,000 casings during the year 1916, and in 1917 will manufacture, according to present expectations, 500,000. The tires are made in all sizes, including millimetric.

#### Hood's Arrow Tread

The Hood Rubber Co. has an Arrow tread representing 75 per cent of its output. This is a single-cured job which has not been altered during the past year. Production schedule has shown an increase toward the straight side and the total capacity of the plant has been doubled and will probably be quadrupled next year. Both red and gray tubes of equal quality are manufactured.

#### Knight Uses Black Side Walls

It seems to be quite true that the appearance factor has a great amount to do with the choice of color in the tread and side wall. The black tread with the colored side wall is quite a common choice this year. Another combination is illustrated by the Knight Tire & Rubber Co.'s tire which is made with a white tread and a black side.

#### United States Tire Business Booming

Between Jan. 1, 1916, and Aug. 15, 1916, as many tires were shipped by the United States Tire Co. as during the whole year 1915, which was a big year. To meet the increased demand, the capacity of the company's plants has been materially increased.

After extended tests, the company is now prepared to produce its new product, the Royal Cord tire in large quantities, and is stocking up its branches. This tire is of the thread cord type, being built up of from four to ten plies of cabled Sea Island cotton, laid into the shape of a tire casing. It is made with a black tread, having a white strip running around the side walls, with the balance of the side walls black. The tread has a continuous ridge at the crown, with transverse corrugations at each side, and is distinctive in appearance.

Four other types are manufactured, with Knobby, Chain, Usco and plain treads. The past year has shown a marked increase in the sale of non-skids and in straight side tires, especially above the 3 and 3½ in. sizes, where the clinchers predominate. The sale of red and gray tubes has shown the same increase as the casing business and the truck tire sales have grown to such an extent that they necessitated an increase in the factory at Providence.

#### Hand vs. Machine Work

Hand-built and machine-built tires are about equally numerous throughout the list of manufacturers. The New Jersey Car Spring tires are all hand made and so are those made by the Mohawk Rubber Co. The Acme Rubber Mfg. Co. uses hand manufacture exclusively. This concern manufactures only fabric tires. The Standard Tire & Rubber Co. manufactures fabric tires only and uses hand-made production.

The Hawkeye Tire & Rubber Co., Des Moines, Iowa, is parallel with these concerns as its output of fifty fabric casings a day are all made by hand.

The Mansfield Tire & Rubber Co. on this same subject

reports 80 per cent of their product made by machine and 20 per cent by hand. This concern has an output of 90 per cent fabric tires and 10 per cent cord. An improvement made by the latter concern, which may be mentioned in passing, is the introduction of the cable base for the straight side tires. The Lancaster Tire & Rubber Co., which produces all fabric and no cord tires, uses only the hand method.

#### Many Secret Processes

Owing to the important part that chemistry plays in the tire business it is but natural that large numbers of secret processes are being developed. Hence the improvements that are made cannot be explained in detail. One of the sources of improvement, though, is in the efficient arrangement of factories, and the tire companies are learning the lessons of production very rapidly. The Gordon Tire & Rubber Co. has been able to greatly increase its output by a factory rearrangement. This concern manufactures fabric tires, of which 75 per cent are hand made and 25 per cent machine made.

There is no part of the country where tires are manufactured that does not report an increase of business. The Marathon Tire & Rubber Co., Cuyahoga Falls, Ohio, states that its business increased during the year to such an extent that it was necessary to double its working capital. The Mohawk Rubber Co. of Akron has increased during 1916 77 per cent and by the end of the year will probably reach 100 per cent. The Gibson Co. of Indianapolis, Ind., which is the general sales agent for the Falcon Tire & Rubber Co., increased its business 125 per cent. The Alliance Rubber Co. of Alliance, Ohio, increased its output 50 per cent and is trebling its floor space and adding \$60,000 worth of machinery.

#### Best Tread Type Disputed

There is some discussion in tread forms as to whether or not the most desirable is the depressed type or the raised tread. The Mattson Rubber Co., Lodi, N. J., makes a depressed non-skid tread which it prefers because there are no projections subjected to road shocks. This is a wrapped tread, single-cure process tire.

Another concern which favors the depressed tread is the Indiana Rubber & Insulated Wire Co., which has changed so that the raised projections on the tread are now twice the width of the Traction tread, formerly manufactured. The color has been changed to white side walls and brown tread.

#### Newcomers in the Field

New tire concerns are coming into the business and among the best known of the newcomers is the Brunswick-Balke-Collender Co., Chicago and Muskegon, Mich., which will devote its production entirely to single-cure, wrapped-tread fabric tires. The Gryphon Rubber & Tire Corp., New York, is a new concern which will not be in operation before the first of the year.

#### Batavia Molded Tread Tires

Batavia is changing from wrapped tread to molded tread manufacture. It is marketing a single non-skid tread, Security, which is 75 per cent of its output. The quantity of the tread stock has been improved and now contains more natural gum. All tires are machine made and the sale of straight sides has shown a great increase. Service stations have been increased and the arrangement of the factory altered to facilitate production. Gray tubes also are made.

#### Goodyear Makes Millions of Tires

Goodyear is making fabric and cord types and the sale of cords has increased 75 per cent during the year. Outside of the Ford sizes, most of the fabric tires are straight sides. Goodyear advocates somewhat lower inflation pressure than

usual, due to the oversize construction of the casings which thus hold more air. A number of new factory buildings have been put up during the year.

Goodyear has increased its output during the year 78 per cent, and has added about 30 acres of floor space. At present it is producing 16,500 fabric tires a day and 1500 cord tires. The company hopes to have reached a production of 225,000 cord tires by the end of this year and to make 600,000 in 1917. Approximately 70 per cent of the original equipment supplied to car manufacturers have non-skid treads. In 1916 3,500,000 tires will have been turned out and this number is expected to reach 6,000,000 in 1917. In 1915, the total number produced was 2,000,000.

The Dayton company produces both its airless tire in which the air space is taken up by a series of piers of live rubber and a pneumatic type. The airless is largely for fire apparatus. The pneumatic has a very high non-skid tread and the company's faith in its durable qualities is evidenced by a mileage guarantee of 6000.

#### Swinehart's Big Gain

Swinehart reports a big increase in straight side business, the demand for this type of tire doubling during the year. Total production has increased 30 per cent and this has called for an increase in floor space of 50,000 sq. ft.

#### Big Four in New Plant

The Big Four Tire Co., has just completed its factory which has 18,000 sq. ft. of floor space and the entire plant will be devoted to the manufacture of Big Four tires. The tire will be constructed entirely by hand at the start though special machinery will be constructed in the course of time. About 100 tires a day will be the capacity after Jan. 1. The big Four tire differs from others in that it is virtually two half clincher tires, there being a clincher rim in the usual place and another clincher rim to which the heavy tread portion is attached. The tire is puncture proof and is made for both passenger vehicles and trucks.

## Carsafe Water-Cooled Non-Freezing Brake

**S**YSTEMS of cooling brakes have usually been found impractical since the cooling extended also the zone of freezing in a most undesirable manner. The liquid around the brake drums is too far away from the radiator, and would

freeze in cold weather when the car is left on the street. The Carsafe system is claimed to solve this problem by using a device to transfer the entire water from the brake cooling system to the radiator immediately upon the stoppage of the engine. The piping is therefore empty and hence free from freezing.

As shown in the drawing, the water for the brake cooling system is taken from the radiator. It flows through pipe 3 to pipes 5 and 6, drawn by the suction pump 14, or by the partial vacuum created in the chamber 2 by the pump, from 6 to drum jackets 7 and 8, and then to a shallow water- and air-tight box 11.

Thence the water rises by pipe 26 to chamber 2 which is simply a thin-sheet-metal water- and air-tight box located under the water level of the radiator. From it the water flows to the suction pump 14 which returns it to the radiator. This completes the water circuit.

#### A Spring Governor

Then there is the spring governor 18 which operates valve 17 in such a manner that when the engine is running, pipe 3 is open, and pipe 4 (which has its upper orifice always above the water, and carries air) is closed. When the engine stops, the pump stops working. At the same time the governor permits the valve to shift to such a position that now pipe 3 is closed, and pipe 4 open. No more water is coming in from the radiator, but there is full atmospheric pressure in pipe 4 and partial vacuum in chamber 2. The pressure in pipe 4 drives the water through the system to box 11, and from there through tube 26 to chamber 2 which must be large enough to hold the entire water used for brake cooling.

Hence, in a very little while after the stoppage of the engine there will be no more cooling water in any of the jackets or pipes of the brake cooling system, which is the reason why the latter cannot freeze.

The presence of the described system of brake cooling will not affect very materially the temperature of the radiator water. On one hand there is the heat wiped off the brake drums, which tends to heat it up, which is helped by the fact that the water in chamber 2 is not as well cooled by the fan blast as the rest of the radiator water. This is however largely compensated by the losses from unprotected metal surfaces of the pipes, brake drum jackets and box 11.

The installation of the brake cooling system does not affect the design of the fan, if it has been properly selected.

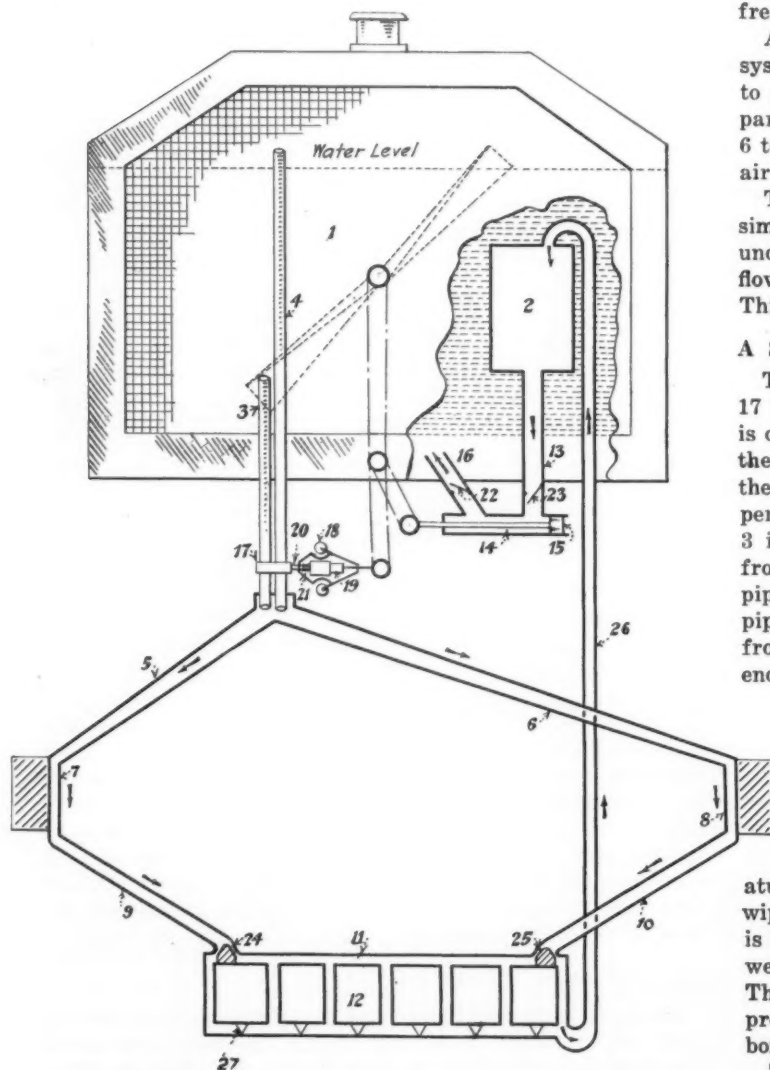


Diagram of Carsafe water-cooled non-freezing brake



# Tire Makers Active in Welfare Work

Big Producers Realize  
Benefits  
Resulting from Mental  
and Physical  
Education of Employees  
—Millions of  
Dollars for Movement



Firestone Clubhouse erected at a cost of \$300,000 for the benefit of employees

**A**KRON, OHIO, Nov. 17—Recognizing the benefits to be derived from welfare work among employees, all of the Akron tire manufacturers are giving thought, money and time to the subject and in many instances have developed remarkable systems for the protection and uplift of the workers.

There is not one of the companies which are prominent in the manufacture of automobile tires but is providing, not only plenty of light and air and cleanliness throughout every department of its factory to a degree unimaginable only a few years ago, but also extends to the workers every advantage of equipment to raise their general physical and moral welfare and to increase the feeling of ease about the present and of happiness for both present and future, which have been found so closely allied to efficient execution of work of all kinds on the part of the employees. These features of factory welfare development include departments for reading, physical culture, modern eating facilities and means whereby the employees receive a reasonable maximum of insurance in case of illness or injury.

## Firestone's Clubhouse

The Firestone Tire & Rubber Co. during this past year has erected a clubhouse consisting of four stories and a basement, 151 by 125 ft., constructed of brick, steel and glass to correspond with the various factories belonging to the company. The basement contains a swimming pool 60 by 20 ft., which holds 62,000 gal. of water. The water is passed through two charcoal filters, one alum filter and two violet ray sterilizers to insure purity. There are fourteen shower baths in connection. The basement also includes a barber shop with four chairs, and eight bowling alleys constructed in the latest and most improved style.

The first floor has a restaurant for factory employees, with a seating capacity for more than 600.

The second floor is furnished with a restaurant for office employees. It seats more than 700 at a time and has a modern kitchen equipment. All bread and pastries are baked here and are thus insured cleanliness and purity.

The third floor contains a reading room and an auditorium with a complete stage effect. Two moving-picture machines have been provided and the company gives educational and entertaining exhibits for the workers. The auditorium is so arranged that the sides may be converted into convention rooms, if desired, and these are sometimes used for conventions or dances.

The fourth floor consists of the club rooms, and contains a library and reading room in combination, and also a girls' rest room, where employees may come between working hours to rest and read.

## A \$1,000,000 Fund

The Firestone company has financed the clubhouse in its construction and equipment, amounting to \$300,000, and intends, through a \$2 fee for male employees, a \$1 fee for females, and a \$1 fee for non-resident members, to make the institution self-sustaining. The company has also entered into other welfare work, including a dental and medical department, and has recently voted a \$1,000,000 fund for employees' welfare and insurance, besides arranging a plan to provide employees with homes at cost on a small weekly and monthly payment basis. The homes are erected on a plot known as Firestone Park, and workers are invited to occupy them without making any large deposit in advance.

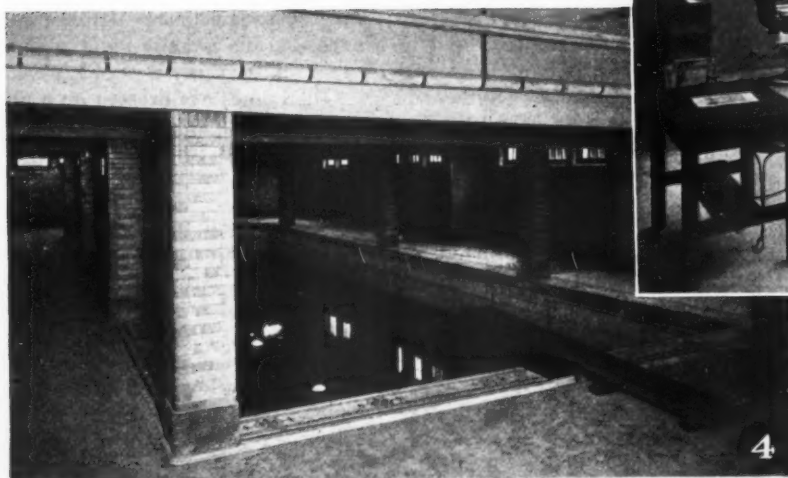
## Goodrich Welfare Work

The B. F. Goodrich Co. provides social insurance, medical supervision and healthful recreation for its employees through its Department of Industrial Relations, which includes divisions of labor, health and safety. The company goes beyond the State law requirements in granting compensation to those injured in its plant and maintains health insurance providing compensation for employees detained from work more than 7 days through illness or injury occurring outside the plant. This compensation is paid from the first day of disability for a period not exceeding 1 year. Married men, single men with dependents and all women receive two-thirds of their wages, and single men without dependents one-half their wages. Other welfare features include a special maternity benefit to married women who comply with the regulations of the health department, a life insurance plan which gives employees \$500 insurance, increasing to a maximum of \$1,000 during the first 5 years of employ and various service annuities are paid with a minimum of \$20 and a maximum of \$100 per month. Employees are given a physical test when entering employment and upon return after illness. Dispensaries, medical clinics and clinics for special diseases are maintained. A corps of visiting nurses is employed.

## Goodyear Factory School

The Goodyear Tire & Rubber Co. has established a factory school, which is attended by 500 students, in which common

# Glimpses in the \$300,000 Firestone Clubhouse



1—A corner of the dining room in the Firestone clubhouse for the use of office employees of the Firestone Tire & Rubber Co., Akron, Ohio

2—Part of the dining room provided for the use of factory employees of company. Note the clean and substantial character of the appointments

3—The barber shop of the clubhouse is fitted with up-to-date equipment and is kept scrupulously clean. Illumination is aided by the skylight forming the ceiling

4—The swimming pool contains 62,000 gal. of water, which is filtered daily. There are fourteen shower baths in connection with it which must be used before entering the pool

5—Auditorium of the Firestone clubhouse which is laid out with convention rooms around the walls. The seats are frequently removed and the space used as a dance hall



school lessons, factory work and technical studies are taught. The company has an athletic director, whose sole duties consist of providing athletic diversions for employees. An insurance plan similar to the Goodrich system is in operation, and a hospital with a factory doctor has been installed. Old age pensions are given. Playgrounds have been provided for children of Goodyear employees and the company has purchased land and erected homes, which the workers may purchase by small instalments at practically cost price. A safety first propaganda was started in the factory during the past year, which has reduced accidents almost 100 per cent.

#### Miller Has Adjustment Board

The Miller Rubber Co. has embodied a sort of adjustment board among the employees of the employment department and allows them to make minor adjustments of difficulties arising among workers. One American and one foreigner, who is an excellent linguist, talk to all employees and to all who apply for work. A hospital has recently been installed and equipped with every necessary facility, and has a trained nurse at its head, who makes visitations constantly to the homes of any employees who are sick or injured. The nurse and one forelady also act as a sort of clearing house for the troubles of girl employees. The company fosters all sports and purchases all essential equipment for indoor baseball, basketball, football and other games, and has provided a field

at Kenmore for the use of the workers. Study clubs are now in process of organization, and a library has been started.

The study clubs include ten courses, consisting of the following: Production problems; office methods; personal efficiency; marketing problems; fundamentals of economics; accident prevention; business law; real estate, insurance and investment; elementary accounting; business English. It is planned to have small groups of eight or ten people take one course at a time, and if more than that number apply, a second group will be started. Classes will be held in the evenings from 5 p. m. to 7 p. m., and supper will be served by the labor department at actual cost.

The company has also instituted a suggestion system allowing any employee to make suggestions and submit them to the administrative offices. Slips of paper and envelopes are provided and boxes are hung from many walls in which the suggestions may be dropped. They are gathered daily and passed upon by a committee of five, appointed by the general manager. Each suggestion taken up and acted upon is paid for with a substantial sum. During the first month of the suggestion plan eighty-six suggestions were received, of which eighteen were considered worthy of adoption, and the employees entitled to reward received from \$1 to \$5. Such recommendations were turned in as a liner improvement, an increased record efficiency, and an improved method for handling scrap. The company issues a booklet monthly giving the authors of suggestions that won rewards.

## Megow Attachment Converts Car Into Tractor

WE have become very familiar with attachments for transforming a Ford touring car into a commercial vehicle. The latest, however, is a device which makes this car a tractor. The accompanying illustrations show the device in action ploughing or breaking a timothy and clover field with two 14-in. stubble plows. The advantage claimed for this device is particularly in regard to the power, which is applied at the driving wheels.

#### Car, Tractor or Truck

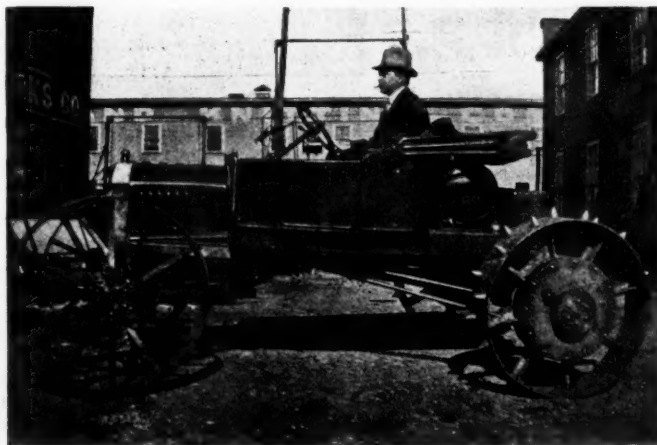
With this device, the inventor, who is Edward J. Megow of Minneapolis, Minn., states that one can use the Ford or other make of car, to which the device is applied for ordinary purposes. He states that in 30 min. the automobile can be transformed into a farm tractor capable of pulling the two 14-in. plows. In another 10 min. a set of truck wheels can be slipped in place and the outfit can be used as a road tractor or truck capable of pulling a great weight. The attachment will probably sell for about \$200.

One of the advantageous features of the invention is that

all the gears are inclosed and run in oil, being thus protected from dust and dirt and rendering it possible to leave the machine out in all kinds of weather.

#### Drive Stresses Taken by Wheels

A spindle is attached at the rear, thus furnishing an extra bearing and relieving the axle bearing of any strain. In the driving drum it will be noted on the side of the wheel where the gears are carried the power is applied at two points opposite one another on the periphery, thus dividing the stresses and eliminating the use of special bearings to take care of undue loads. As the point of power application is several inches from the center of the wheel, good turning torque is secured. All the working stresses are taken by the tractor wheels and none by the frame structure. The only change in the power plant of the car is that it is necessary to install a circulating pump and to increase the speed of the fan. With the device the gear reduction can be altered within wide limits, thus rendering it possible to take care of widely varying conditions.



Left—Megow tractor attachment on a Ford roadster and drawing two 14-in. stubble plows. Note deep furrows and also plowed area to the right of the machine. At the right the same vehicle, in side view, gives an idea of the type of wheels used for tractor purposes

# Republic Rubber Co. Protects Workers

Safety Placards Throughout Factory Buildings and Yards,  
Railings and Guards on Machinery Some Measures Adopted



Safety First display window situated near the main entrance to the plant of the Republic Rubber Co., where all matter pertaining to safety and welfare is displayed for attention of workers

**S**AFETY FIRST, that slogan of accident prevention originating in the fertile mind of a minor railroad employee several years ago, has worked itself into our national life to an extent that no other slogan has. Not even the old C. Q. D. or the more modern S. O. S. of a ship in distress at sea is so well known as these two warning words first adopted by the railroads. This slogan and the spirit back of it next became one of the principal considerations of factory management. The plant of the Republic Rubber Co., at Youngstown, Ohio, is not considered a dangerous place to work, but, as in any other establishment employing a large number of men and using various types of intricate machines, the carelessness of a few is a threat to the welfare of many.

In order to safeguard its employees from accidents which, although not actually always impending, might occur at any time, the Republic company has placed upon its staff George Hodgson, whose duty it is to sleuth about the 17 acres of floorspace of the factory with an eye ever watchful to the prevention of possible accidents with resultant injury to the men who make the tires.

The factory managers for the Republic company must have had in mind that old adage about locking the barn after the horse was stolen when they planned this policy. For it is usually too often the case that a machine is fitted with an accident preventing screen or other device after that machine has killed its man. The reverse is true in the Republic

plant where the whole policy is to prevent even the first accident.

A policy of accident prevention in a manufacturing establishment has as its end the safeguarding of mechanical working parts by protective devices suited to the particular requirements. The beginning of a campaign for the prevention of accidents must appeal to the human element. Education is the first requisite of such a campaign. Without education for carefulness the policy can work to but 50 per cent of its efficiency. Money invested in protective devices will not realize the fullest possible results without education.

Republic Rubber Co. officials recognized this truth in plotting its policy for the elimination of preventable accidents. Consequently, the first step taken was an educational one. The entire factory was placarded throughout with Safety First signs and warnings designed to make the employee think first of his own welfare and of the welfare of those about him. Above the main entrance to the factory hangs a great Safety First sign. This sign, placed as it is, gives the employee the keynote of his whole day's labor as he enters the factory in the morning. In addition to being impressed by these warning words as he enters the factory for the first time, the new employee is given a little booklet as soon as he is hired. This booklet contains the factory rules and emphasizes the fact that he is always to guard himself and his fellow workmen.

On this page appear a few of the signs and warnings which have been posted about the factory in furtherance of the educational side of the campaign. On the opposite page are shown some of the devices which inclose machinery that might otherwise be dangerous when carelessness played its part.

Another simple guard is the balcony rail guard made out of expanded metal. This guard is used all around the balcony on the second floor of the machine shop. Ordinarily this space would be open and hammers or other articles might fall through it to the injury of workmen below.



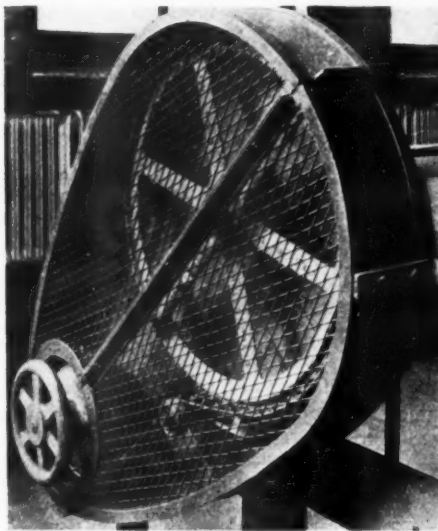
Some of the signs which are used about the factory buildings, yards, etc., of the Republic Rubber Co. plant



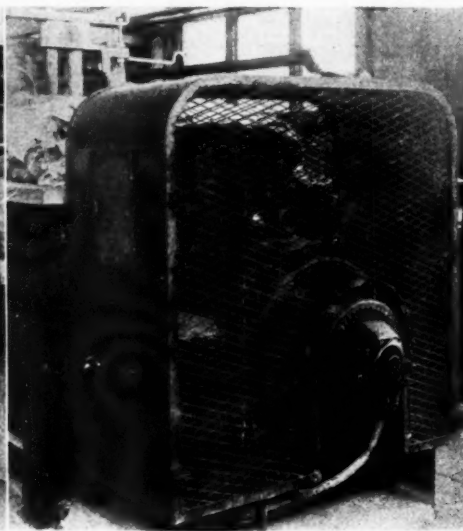


A safety sign mounted at one of the entrances to the factory of the Republic Rubber Co. It is electrically lighted at night

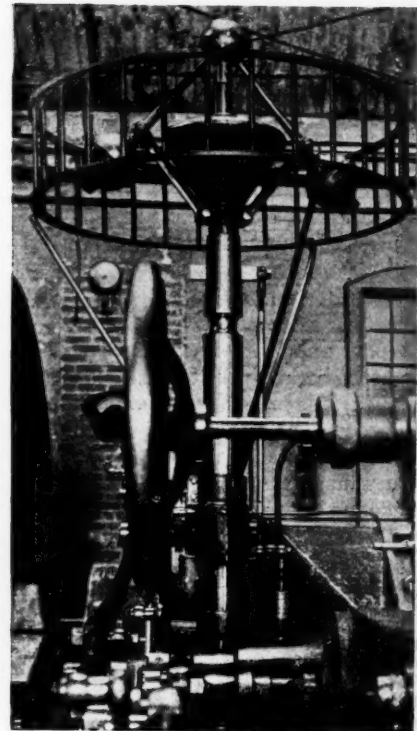
## Safeguarding Devices Used for Protection of Workers in Republic Rubber Factory



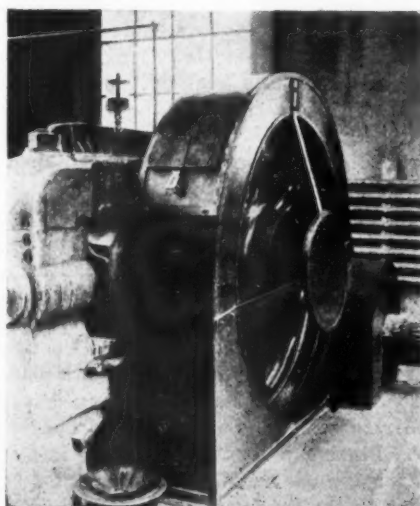
Above is illustrated the type of expanded metal and sheet iron guard employed in the Republic factory for sprocket and chain drives of the sort illustrated



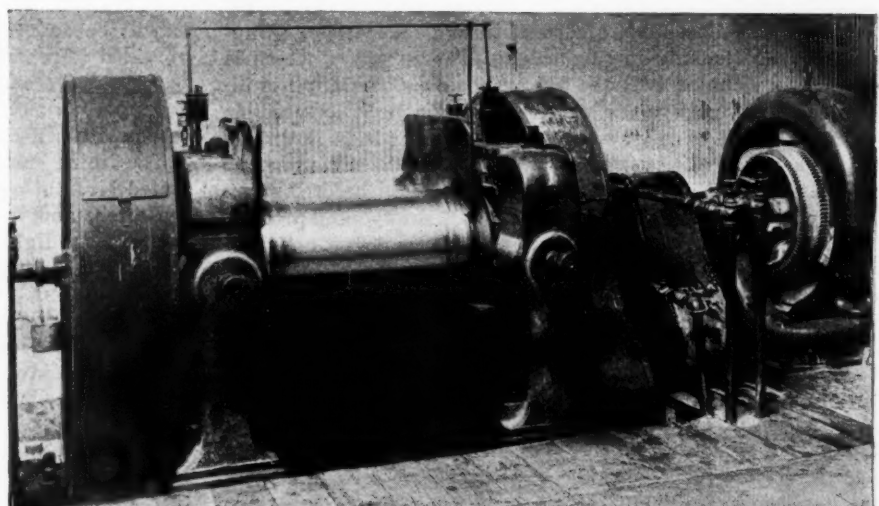
Another expanded metal and sheet iron guard for covering motors, starting boxes and switches, making it impossible for either workers or material to touch them



While not ordinarily dangerous, a fly-ball engine governor has latent possibilities, and it was considered wise to install the guard illustrated above



Guard used on rubber mills in calendar room. Note the covered keyhead and hinged opening in front of guard for greasing and inspecting the gears



The rubber refining mill illustrated above is an excellent example of the thorough way in which the machinery of the Republic company is safeguarded. All gears are entirely inclosed and each mill is fitted with an electric safety stop over the rolls, which instantly stops the machinery of the mill in case of an accident

# The Determination of Headlight Glare

Present Chaotic Condition of Legislation Throughout Country  
Largely Due to Lack of Definition of Glare, J. B. Replogle  
Tells Detroit Section of S. A. E.—Rules in Various Cities

**D**ETROIT, MICH., Nov. 16—When an automobile headlight is so powerful as to be dangerous in its blinding effect it is a glare.

Glare cannot be regulated either by a bulb or a reflector but must be determined by reaching a certain unit standard of light beyond that which is considered glare, this unit to be discovered by the effect on the vision of an approaching driver.

These were the principal details on the subject of glare discussed by J. B. Replogle, director of research of the Remy Electric Co., before members of the Detroit section of the Society of Automobile Engineers last night.

## What Constitutes Glare?

In his address Mr. Replogle confined himself entirely to the question of what constitutes glare and how it can be measured, thus precluding any discussion as to the merits of the various methods of eliminating glare. He told of his investigation of the ordinances of the different cities and States and read a number of them showing how futile and in many instances ridiculous all attempts have been in the effort to define or regulate glare.

"When I got through with this mass of correspondence," said Mr. Replogle, "I found myself in about as puzzled a condition as I was at the beginning. The only reference made to a unit was where the candlepower of the bulb was specified. Inasmuch as it is a matter of common knowledge that the effect produced by a lamp of a definite candlepower varies many hundred per cent according to the way it is reflected or condensed, the candlepower unit is a meaningless one.

"The glaring effect of a headlight is to a very great extent a function of its environment. For instance, in broad daylight the brightest headlight does not cause inconvenience, while on a very dark night on a country road a headlight which is ordinarily considered to be well dimmed often produces extreme discomfort and constitutes a real menace. Suppose you are looking in subdued light at an object which is sufficiently illuminated to be plainly visible. The pupil is dilated so that the eye can receive as much light as possible from the object to be viewed. If now a bright light is thrown in your eye, the pupil contracts so that while the same amount of light is coming from the viewed object as before, but a small portion of it can reach the retina of the eye and produce vision. This reduction of vision the ophthalmologist calls 'depression in vision function.'

## Glare Quantitatively Defined

"A qualitative definition of glare is that it is depression in visual function due to contrast between the direct illumination of the eye from a source of illumination and the illumination of an object it is desired to view. This glare is prohibitive when the object of vision is difficult to discern. Accepting this as a working hypothesis, we next approach the question as to a unit of glare and how to measure it.

"In technical photometry, a source of illumination is known by four characteristics. 1. Its luminous intensity or the rate at which it is emitting light in a given direction: its unit is the candlepower. 2. Luminous flux or the total amount of

light emitted in unit time: its unit is the mean of the spherical candlepower. 3. Illumination or the illuminating effect produced at a given distance: the unit is expressed in candle feet or foot candles. 4. Intrinsic brilliancy which is expressed in mean spherical candlepower produced by the source in question and an arbitrarily selected standard.

"The candlepower or the unit of luminous intensity has been defined as the light produced by a standard sperm candle which consumes speraceti at the rate of 120 grains per hour and the candlepower of the source under consideration is measured by placing a screen between a standard source such as a standard candle and the source under investigation and adjusting its relative distance from each until it is equally illumined by each.

"Luminous flux is measured by placing the source of illumination within a dead white sphere and comparing the illumination produced on the interior surface of the sphere by that of a standard source.

"Intrinsic brilliancy is obtained by dividing the luminous flux by the superficial area of the source of light. The unit of illumination, the foot candle, is defined as the illumination produced by a standard candle at a distance of 1 ft. from the object.

"Let us see if the unit of headlight glare cannot be successfully adapted from the standpoint of the unit of illumination, or the foot candle. It is wise to establish our units so as to apply to the most perilous situations with the feeling that the other situations will be thereby satisfactorily taken care of."

## A Psychological Peril

Here, Mr. Replogle pointed out that there is a psychological peril when animate intelligence is confronted by a powerful swift-moving machine and that bright lights tend to increase the danger and stated that if conditions are so arranged that it will be safe for the animate intelligence, horse or man, provided it retains its self-control, that that is all that can reasonably be expected. In short, any headlight that causes a dangerous situation, even though the animate intelligence retains its self-control, is a glare.

The thing most interesting to the approaching driver, stated Mr. Replogle, is the ability to see the road and to avoid the ditch, and to do this there must be a minimum relation between the light shining in his face and eyes from the approaching headlights and the illumination on the roadway.

Pointing out that it is a superstition to believe that a driver can overcome the dazzling effect of an approaching car by turning on his own lights, Mr. Replogle applied this detail to the problem of glare by an example, using two principal points: A—the roadway which the approaching driver endeavors to see in order to steer correctly; B—the eyes of the approaching driver. Placing point A 5 ft. to the left of the fenders of the car carrying the headlights and about 4 ft. in front of it as the point on the roadway which the driver is trying to see, and placing point B, the eyes of the driver approaching, not less than 3 ft. from the ground and between 25 and 50 ft. from the headlight, he showed that the eyes at point B will be dazzled by the glare if the light striking



them is much greater than the light from the headlight that strikes point A. Experiments, he stated had proven that when the illumination at point B is more than  $4\frac{1}{2}$  times that at point A, the light constitutes a menace and should be termed glare.

To prove these remarks, Mr. Replogle used a headlight, a 15-candlepower light and a piece of steel ending in a circle and attached to a rheostat, asking several members present to peer through the circle at the object before and below the headlight until they could distinctly distinguish it. The light was made more and less powerful until found correct. Later in the evening these tests were checked and found to correspond to previous ones that produced the estimate of  $4\frac{1}{2}$ . Mr. Replogle also introduced an instrument he has devised and which he calls a glaremeter, a device which may be used in conjunction with his estimates to discover glare.

#### Several Brief Discussions

Others followed the address by short discussions. Dr. Louis Bell, of Boston, associate of Thomas A. Edison in the Edison laboratories, objected to the distance of 25 ft. specified by Mr. Replogle, and pointed out that when two automobiles operating at 30 m.p.h. are close to one another they must pass at a speed of 88 ft. a second, which would not allow sufficient time if the drivers had to wait until they were so close to determine their movements. E. C. Patterson, president of the Warner-Lenz Co. of Chicago, made a short address, telling of the numerous communications his concern receives constantly that inquire for means of eliminating glare. E. F. Wackwitz, of Gray & Davis, Inc., objected to Mr. Replogle's ideas and stated his belief in the ability to regulate glare by regulation of filaments and reflectors, and said that insufficient light caused more harm than glare. W. E. McKechnie, of the Cadillac Motor Car Co., and chairman of the committee on headlight glare, gave a brief description of the work of the committee and declined to announce results of tests pending their completion. J. Caldwell, of the National Lamp Works, recommended parabolic lamps arranged with high and low-power bulbs for city and country driving. He also stated that various experiments made by his company led them to believe that most devices that cut the intensity of beam tend to limit the view of action and that the best plan would be to eliminate the light from the upper angles by tilting it downward to an angle one-half of the angle equal to the spread of the beam.

Mr. Replogle in a short summary answered the various criticisms, stating "Glare as I used it is only jargon and not at all scientific and I mean by glare merely the headlight proposition we discussed here to-night. If 25 ft. is safe it is also safe when the distance is 200 ft. Contrary to Mr. Wackwitz, I believe that it is glare and not insufficient light that causes the hazard. Decrease the light in the eyes of an approaching man or increase the light on the road and you eliminate the danger."

#### Over 400 in Attendance

More than 400 people attended the meeting, including members and guests. Among those present were Joseph Bijur of the Bijur Motor Lighting Co., Hoboken, N. J., Alden L. McMurdy, consulting engineer, of New York, R. H. Wells of the Badger Brass Co., Kenosha, Wis., and K. W. Zimmer-schied of the General Motors Co.

To secure data on the ways in which the various cities are dealing with the glare problem Mr. Replogle sent letters to fifty-eight cities. Ordinances were received from twenty-three cities, sixteen of which follow:

*Boise*—Blinding or searchlights prohibited.

*Buffalo*—Dazzling or blinding light—or a lamp or light exceeding 20 candlepower with or without reflector—prohibited.

*Cheyenne*—Should not give forth a blinding glare, but should shed a rather subdued light.

*Chicago*—Unlawful to use acetylene, electric or other bright headlight or any headlight the rays of which shall be intensified by any parabolic or condensing reflector, unless such headlight shall be properly shaded so as not to blind, dazzle or confuse other users of the highway or make it difficult or unsafe for them to ride, drive or walk thereon: Inspection Board provided.

*Cincinnati*—Similar to Chicago, but shading or dimming upon half of lens is deemed compliance.

*Cleveland*—A lighting device is prohibited which concentrates and projects any part of the light into a beam, unless the said lighting device is so adjusted that at a point, a distance of 75 ft. or more in front of the vehicle, no part of the reflected beams of light shall be visible more than 3 ft. above the surface of the roadway.

*Denver*—Same as Chicago.

*Grand Rapids*—Same as Chicago, with the addition that the use of amber glass (so-called) as a screen shall be deemed a compliance when effective.

*Louisville*—Dazzling or glaring headlights prohibited.

*Milwaukee*—Lamps prohibited which project main light rays above a plane which shall strike the roadway more than 200 ft. forward from base of vehicle on a horizontal roadway.

*Omaha*—Headlights must be so focused and directed that the uppermost rays shall not be elevated more than 6 ft. above the surface of a level roadway at a point 100 feet ahead of the lamps. Must be dimmed by being suitably shaded or covered that there shall not be a glaring or dazzling effect therefrom.

*Portland, Ore.*—Headlight shall be so controlled that it will not blind, dazzle or confuse other users of the streets or make it difficult or unsafe for them to ride, drive or walk thereon.

*San Francisco*—Must be so dimmed or covered that the glaring effect of headlights shall be done away with.

*Salt Lake City*—Light prohibited of such power or strength as to dazzle pedestrians or drivers of vehicles moving in opposite directions.

*Toledo*—Same as Chicago.

#### Baltimore's Elaborate Provisions

"The city of Baltimore has gone into the matter very much more thoroughly than any other city from which we received returns and I shall read their ordinance almost in its entirety as being representative of the most painstaking attempt to cover the situation," said Mr. Replogle.

*Definitions*—The term "headlight" shall be taken to embrace any lighting device designed to display a light on a motor vehicle in the direction in which said motor vehicle is designed to proceed, the term including what are commonly denominated as "side lights" when the same are fitted with reflectors and equipped with electric bulbs or other means of illumination of more than 4 candlepower.

*Maximum Standards*—No motor vehicle in use in Baltimore City (including motorcycles) shall be equipped with any electric bulb or other lighting device of a greater rated capacity than 30 candlepower, no matter how the same may be shaded, covered or obscured.

No "side light" shall be equipped with any electric bulb or other lighting device of a greater rated capacity than 4 candlepower unless shaded, covered or obscured as hereinafter provided.

*Operation and Control*—No motor vehicle, including motorcycle, shall be operated within the limits of Baltimore City equipped with any device by which the headlights can be switched or cut off or on, covered, shaded, deflected, dimmed or lowered from the seat, unless the headlight itself is equipped with some means of preventing glare which has been

approved by this Board. In short, the ordinary "dimmer" or auxiliary light operated by a switch from the seat will not be permitted unless the headlight so operated is itself so shaded or constructed that, even when cut in from the seat, it will not produce glare.

**Oil Lamps**—Unless an oil lamp of exceptional brilliancy be used, no device to prevent dazzle or glare will be required. Where, however, oil lamps of great brilliancy are used, some anti-glare device as hereinafter prescribed shall be used with the same.

**Gas Lamps**—All gas headlights (or sidelights of over 4 candlepower) shall be equipped with some anti-glare device as hereinafter prescribed, this provision to apply to motorcycles as well as all other motor vehicles.

**Electric Lamps**—All electric headlights (or sidelights of over 4 candlepower) shall be equipped with some anti-glare device as hereinafter prescribed, this provision to apply to motorcycles as well as all other motor vehicles.

**Anti-Glare Devices**—The use of any headlight of not over 30 candlepower shall be lawful where the glass in front of the same shall have been covered or coated with tissue paper, paint, frosting or any other substance or material of sufficient opacity to prevent the outlines of the flame or electric light being visible when looking through the glass from the front. If desired, a circular space not over two inches in diameter may be left clear in the center of the front glass or a space not over 25 per cent of the entire area below the level of the bottom of the flame or bulb. If these latter options come to be abused by motorists to such an extent as to defeat the purpose of the ordinance under which these rules are adopted, this portion of this rule permitting any portion of the front glass to be clear will be revoked by the Board without notice.

(Where the use of non-blinding devices of any kind cut down the light too much the new nitrogen electric bulb recently put on the market will be found to give additional light even when of the same candlepower as the ordinary bulb.)

Acting under the authority conferred by Section 5 of Ordinance No. 630, approved May 27, 1915, the Board of Motor Vehicle Headlight Inspection has heretofore approved, and will from time to time hereafter approve certain special devices designed for the prevention of glare. Motorists are authorized to use any such device, and upon purchasing the same are given a certificate from the dealer to the effect that the same has been duly approved by this Board. The ordinance provides in effect that said certificate when displayed to any police officer will render the motorists immune from arrest under said ordinance.

#### Proper Adjustment Necessary

No certificate issued by the Board as to any special anti-glare or non-blinding device is effective, according to its terms, unless such device is properly adjusted as directed by the maker. Motorists should therefore be careful in the first instance to see that such devices are properly adjusted, and, in the case of those apt to get out of adjustment, thereafter to see that they remain in proper adjustment. Most of the devices approved by the Board are not susceptible of improper adjustments, and such type of device is preferable.

*In view of the dangers attending driving at night without adequate light, the Board does not approve the extinguishment of headlights outright. The devices above described all yield sufficient light to make night driving safe, but at the same time overcome the dangers attendant upon the use of glaring headlights.*

## Moon Coupé and Convertible Sedan

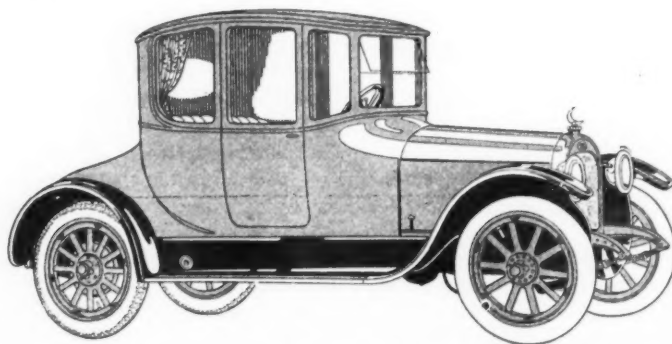
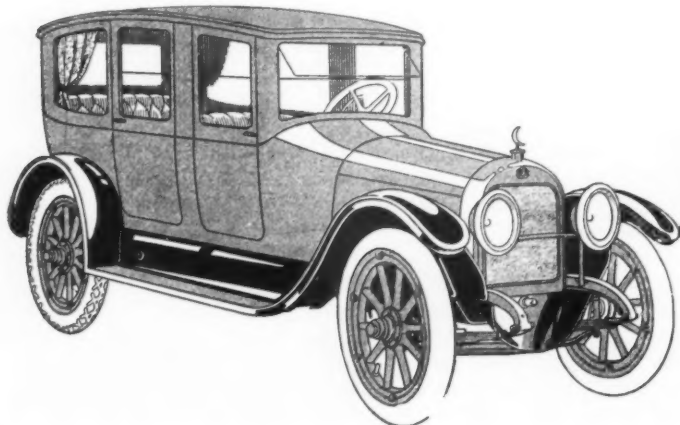
THE Moon Motor Car Co., St. Louis, Mo., has included a four-passenger coupé and a convertible sedan in its line of closed cars for the coming season. These are illustrated herewith. In the coupé the three-passenger main seat is staggered and set back from the driver's seat, which has a glove box behind it. There is an auxiliary folding seat in the right front corner for the fourth passenger. Plate glass windows without sash and fitted with anti-rattlers are used, all dropping in metal channels lined with felt. A split type ventilating adjustable windshield is employed and there is an electric dome lamp. The coupé is fitted only to the 6-66 chassis, this model selling for \$2,150.

The convertible sedan is a five-passenger type, the top being of aluminoid steel and upholstery similar to that for the coupé. This model is made for the 6-43 chassis, selling for

\$1,450. It has a dome light in the center of the top and an integral limousine windshield.

The other closed models which the Moon company is furnishing for the coming season consist of four-passenger cabriolet types, seating three abreast and one on a folding drop seat, and selling for \$1,850 on the 6-43 chassis and for \$2,150 on the 6-66; and a seven-passenger sedan with a large door at each side and a slanting windshield. This sedan is fitted to the 6-66 chassis and lists at \$2,250. It is a Springfield metal body type with pillar partitions between the windows.

Upholstery on all models is in black or Spanish leather with dark blue or green broadcloth above the belt line, although either broadcloth or whipcord may be used throughout.



Above is illustrated the Moon convertible sedan top mounted on a Moon chassis. This top is easily and quickly removed. At the left is the new Moon four-passenger coupé. The sashless door windows of heavy French plate glass drop and are fitted with patented window lifts. There is a dome light in the center of the top and the windshield is made in three pieces.



# Successful Business and the Trade Press

Industrial Changes in This Country and in Europe of  
Greatest Importance to Our Business Interests Best  
Brought Out and Discussed in the Trade Journals

By Edward N. Hurley  
*Chairman Federal Trade Commission*

**EDITOR'S NOTE:**—This article consists of extracts from the address delivered by Mr. Hurley on the subject before the recent meeting of the Associated Business Papers in New York.

**U**NDER present industrial conditions both in this country and in Europe it is especially desirable, and in fact, actually necessary that we keep in touch with the changes and developments taking place throughout the world. With this idea in mind, Edward N. Hurley, chairman of the Federal Trade Commission, has been keeping in close touch with the business papers and the following observations are based on his experience with these publications as indexes to the world of successful business.

## Industrial Changes in Europe

When we think of Europe we think of a continent engulfed in war, devastated and disordered, but I want to say to you gentlemen, that we must correct that conception. While in many respects we know little of what is going on in the warring nations, we do know that within sound of the guns, almost within reach of the falling shells, Europe is reorganizing her industries. Under the stress of a life and death struggle every effort is being made to obtain the highest efficiency in the production, the distribution and the use of commodities of all kinds. Conservatism in industrial ideals and methods has been blasted and shattered to pieces in the shock of war, old systems that normally would have hung on for years have been discarded in a day; old equipment that would have been retained for years has been scrapped as fast as possible for new installations of the most advanced types. New processes are being discovered, new inventions are being made, and new forms of organization are being created. Let me illustrate. Industrially, France has been preeminently the land of small-scale, highly individualized production, but she now lacks human hands. In France, little farms that for generations have been farmed practically by hand or with the aid of a horse or two, are being thrown together and farmed cooperatively by tractors, gangplows and modern agricultural implements. France must rely on machinery. Her business men are studying and are applying American systems of manufacture in factory construction, in equipment, and in large-scale, highly systematized production.

England industrially has been preeminently the land of yesterday. Conservatism was the dominant characteristic of British business. While Massachusetts was making textiles with automatic looms under conditions that permitted one operator to tend from sixteen to twenty-four machines, Lancashire clung to old equipment and conditions under which one operator could tend but four machines. But at last England is aroused, and to-day American books on efficiency and scientific management are being bought by the hundred and studied all over England. The war has compelled Great Britain to make 30 years of industrial progress in 30 months.

Before the war Germany was probably the most highly organized and efficient manufacturing nation in the world, but in Germany organization and efficiency have been still further developed and, no matter whether victorious or de-

feated, the Germany that emerges from the war will be years ahead of the Germany we knew in 1914.

## We Must Keep Step

These changes are of great concern to us. We may not realize this to-day, because things are coming our way now, but we must look ahead to the future conditions we must prepare to meet. Within 5 years we shall find a new Europe competing against us, with war-sharpened brains and war-hardened muscles, not only in our foreign markets but also right here at home. If our industries are not to be caught slow of mind and flabby of muscle we must improve our business organization, must increase our manufacturing and merchandising efficiency and must keep pace with every step in Europe's industrial progress.

## Individuality Plus Efficiency

It is my belief that if the smaller merchant and manufacturer who has no adequate cost accounting system will practice the fundamentals of business and will take the first step toward improving his present methods, he is bound to succeed, and it will be possible for him to succeed on a scale that will mean expansion and development. If he does adopt sound business methods it will be easy for him to compete with the large merchandising and manufacturing firms of the country, as individuality plus efficiency will take care of itself under any and all conditions.

## Banker Helping Sound Business

The man who does not know his true costs is the man who prices his goods foolishly, and thereby impairs the business of his sound competitors at the same time that he ruins his own. Too low price making, based on guesswork or on partial costs, is a menace to sound business. Please understand me, the menace is not in underselling, for a business concern must expect to face the low prices that are due to efficiency. But even the most efficient concern is not always able to meet cut-throat prices based on ignorance.

It is time for the business men of this country to get their house in order if they desire to improve their standing at their banks. I predict that within 5 years there will be very little money loaned by any banker in the United States, to any merchant or manufacturer who does not present a statement showing detailed information, not only regarding his true assets and liabilities, but also indicating that he is conducting his business in an efficient manner and that he knows his true costs.

## Trade Associations

Much can be accomplished through trade associations.

The trade association has a wide field of useful and proper activities. Concerns in the same industry may take common action looking toward improving their processes of manufacture, standardizing their products, improving their systems of ascertaining costs, and obtaining credit information. The

welfare of employees is one of the important matters which can be best developed by cooperating in associations. The smaller manufacturer who has not the laboratories and the experts to work out his many problems by himself is especially benefited by being a member of these trade organizations. The present tendency of the larger firms to think of the smaller man in the proper spirit and to assist him in arriving at some practical method of meeting his many problems—in short, to live and let live—is to be particularly commended.

#### Price-Fixing Bores

An underlying fear lingers in the minds of some people that trade associations, if allowed to exist at all, will go too far. They assume that where competitors are allowed to meet and discuss the main facts of their business, they will inevitably discuss, perhaps in secret, those activities which are illegal. It is true that there have been associations which have violated the law and attempted to fix prices. The great majority of our associations, however, have undoubtedly been occupied in necessary and proper work.

Suppose that there are 500 trade associations organized for the purpose of improving the conditions of their industry, such as standardizing their products, improving their cost accounting methods, and discussing their common problems. Suppose that ten of them take advantage of this opportunity and fix prices, which of course is illegal. Is there any reason why the Government should condemn for this reason the 490 who are endeavoring to work out their managerial problems in such a way as to bring benefits to their business and to the country as a whole? It was once the policy of the Government to devote most of its efforts to opposing and ferreting out the methods of the ten and to neglect or condemn, without a hearing, the 490. The Federal Trade Commission is opposed to the ten who are violating the law and will start proceedings against them if their acts fall within its jurisdiction; but it feels that its attention should be given especially to the 490 and that it should assist and co-operate with them in improving their business.

I am heartily in favor of competitors meeting in trade associations when they meet for the purpose of improving their cost accounting methods, discussing better systems of standardizing their products and materials, and working out more efficient methods of producing their products at the lowest possible cost, or any other questions that go to develop efficiency.

When trade associations meet for these purposes every member profits by it; every stockholder and employee is benefited. It is also helpful to our country as a whole. The Government should encourage and assist the development of trade associations of this kind.

#### The Broad View of Business

It is my belief that the business men of the country in trade associations are going to profit materially by coming in contact with each other, but I realize that possibly some associations through ignorance or design may take advantage and do things directly or indirectly that violate the law. I am not in sympathy with the class which knowingly resorts to these methods, and it is my hope that cases of this kind will be few and far between. Organizations of this kind which violate the law are doing a great injustice to the honest trade associations and business men of this country.

We cannot develop efficient methods of manufacturing and improve the conditions in our respective industries, which are needed so badly, if, when we meet in trade associations, our thoughts are not on improving our manufacturing methods and ascertaining our true costs, but on the question of fixing prices.

One of the great needs among American business men to-day is a broad view of business in general and a comprehensive grasp of the needs of industry as a whole. Too

many American manufacturers and merchants center all their energy and attention upon their particular establishment and the work of making profits for it. Men at the head of factories need the point of view of what might be termed the statesmanship of business. They need to appreciate the fact that their plant is a part of a great industry; that their individual welfare depends very largely upon the welfare and progress of the industry as a whole, and of industry in general. Whatever promotes the welfare of other concerns in industry and the welfare of that broad group of people which we call the public is bound to react favorably on individual concerns.

#### Government and Business

Government and business, more than anything else, need, as it were, to sit down together and consider the problem of our business and industrial welfare, not from the point of view of the law books, but from the point of view of economic development. If Government and business for once understand each other, one-half of the problem of successful co-operation among American business men for legitimate and necessary ends will be solved.

If Congress has been suspicious of business, business men are in a measure to blame for this condition. Too frequently they have neglected and refrained from coming in contact with members of Congress. If the business men of this country would take an interest in the work of their Senators and Congressmen and endeavor to confer with them frequently on the many problems with which they have to contend, I am sure they will find that the Senators and Congressmen will be willing and anxious to learn the facts about business. If business men will do their part by taking an interest in public affairs, they may rest assured that the Senators and Representatives will be only too glad to do theirs.

When I went to Washington I thought, in common with many other business men of the country, that Senators and Representatives were in Washington to do as they pleased, frequently ignoring the wishes of their constituents, particularly those who happened to be business men. My practical experience in Washington satisfies me that I was mistaken. The members of Congress wish to do the right thing by the people of the country. We cannot expect them, however, to be familiar with business problems unless we take an active interest in bringing the facts of business to their attention. It does not create a good impression if the only time Congressmen hear from business men is when some question comes up before Congress to be voted on. We must do something more than respond to the request of the secretary of some association to send a wire. We must take an active interest in public affairs.

Labor has accomplished a great deal in the way of legislation because labor is organized and thinks collectively of its problems. The same is true of the farmers in their work to secure legislation. Business men, however, have received very little in the way of helpful legislation, and the reason in part for this is that they have not approached their Congressmen in a proper spirit and because they have not put themselves out to co-operate in a sympathetic, cordial way with them.

It is my belief that the business men of the country now fully appreciate that Government wants to help them. We must, however, lay aside our former critical attitude. We must face the problems practically and sympathetically. We must not allow our prejudice to affect and bias our better judgment. We must be business men first. If we do this, I am sure that we will receive what we are entitled to.

#### Trade Journal's Part

Many suggestions have been made by writers and lawyers, of note, by captains of industry and legislators, prescribing different remedies for improving business conditions. There



is no one remedy that will give relief to all our ills. What will help one industry may injure or kill another. But there are a few fundamental principles upon which may be based the diagnosis and treatment of ailments of business.

#### Breadth of Outlook Essential

In last analysis success in business depends upon the intelligence of the individual manufacturer. If he does not understand both the details and the broad aspects of the industry of which he is a part, he cannot expect to be successful. American business men do not realize the value which trade journals and technical magazines may be to them in increasing the efficiency of their factories and in giving them a broad and comprehensive view of their business. Our foreign competitors read almost every article published upon their business with great care and thoroughness. Many of them

have duplicate copies of their favorite trade papers sent to their homes so that they may read them away from their business without being disturbed. Many foreign manufacturers contribute articles to these journals on phases of the business with which they are most familiar. Such articles are bound to be helpful and have a constructive effect. Our trade journals and technical papers are the best in the world and they should be encouraged and supported by our business men. Copies should be placed where employees can see them and they should be urged to read and study them. These papers are preaching the gospel of sound business on practical lines and are helpful not only to business but to the country as a whole. If the suggestions made by them in the past had been followed by our business men it would not be necessary at this time to point out some of the fundamental weaknesses in American business.

## Millington Converter Makes 2-Ton G. M. C. Into a Four-Wheel-Drive Truck

THE Millington Auto Engineering Co., Chicago, is putting on the market a standard set of parts for converting a G. M. C. 2-ton truck into a four-wheel-drive machine. In rearranging the car to take this new form of drive, 90 per cent of the standard parts are maintained without interference. The front axle, however, is largely reconstructed.

#### The Special Axle

The new axle is drop-forged nickel steel fitted with a hollow spindle of the same material and stub shafts of chrome vanadium steel. Timken driving plates, hubs and bearings are used and the drive is by Timken-David-Brown worms.

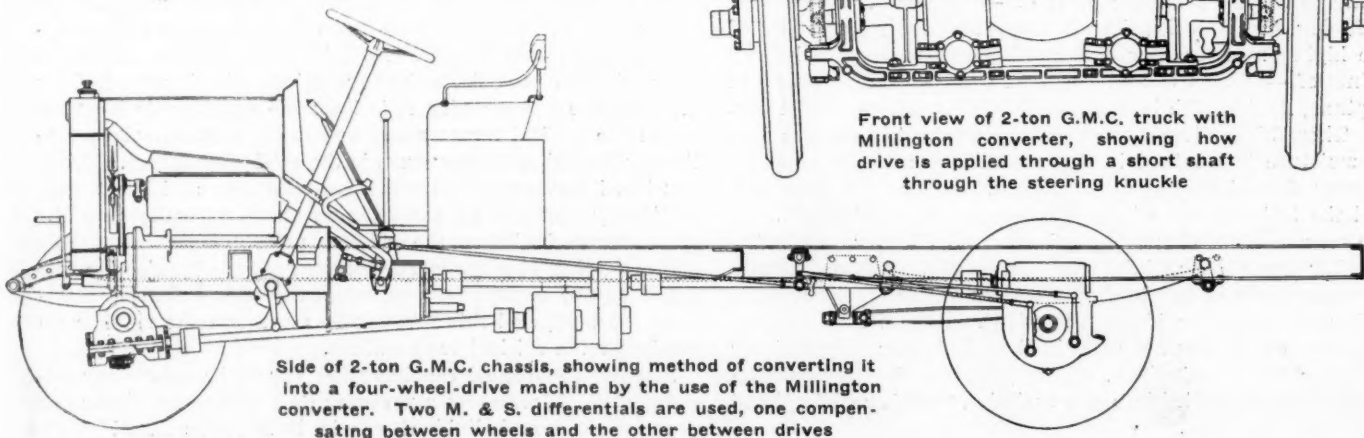
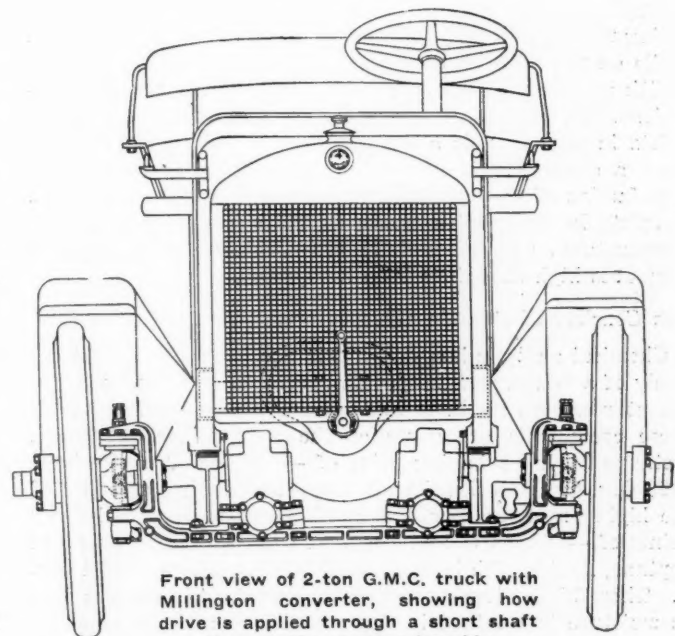
The accompanying drawings illustrate the method of applying the Millington four-wheel-drive to the truck. It will be noted there are two parallel shafts running forward on either side of the engine carrying the drive to the front axle at two points. From each of these points the propulsion is transmitted by a short shaft through the steering knuckle, which contains a bearing, to the wheels. There is also a chain case containing two differentials, one which compensates between the right and left wheels and the other between the front and rear drive. M. & S. differentials are used and the chain is a Whitney silent type working on case-hardened sprockets. The two parallel shafts which carry the drive forward are nickel steel.

#### Advantages of the Construction

Some of the advantages which are claimed for the construction are the low center of gravity; location of engine

under a hood and low in the vehicle, as well as in the center of the tread; the use of 90 per cent of the standard parts of the machine; perfectly balanced weight, both sprung and unsprung; use of direct drive to the rear axle resulting in the delivery of the greater percentage of power where the greater percentage of load is carried; and the general conformation to standard practice in the design and appearance of modern motor trucks.

A tensile strength of 120,000 lb. is claimed for the axle, and the same strength obtains for the hollow spindle and the stub shafts.



# Gasoline from Natural Gas—II

Gas Consists Almost Entirely of Paraffin Hydrocarbons—  
Only Gas Rich in Gasoline-Yielding Members Suitable  
for Use in Compression and Condensation Process

By Bernard N. Glick

**EDITOR'S NOTE:**—According to government reports the casing head gasoline industry, or production of raw gasoline from natural gas, increased 53 per cent in 1915 over 1914, an average price of 7.9 cents per gallon being received for the unblended product. The same authority estimated that 24,000,000,000 cu. ft. of natural gas was utilized, with an average recovery of 2.57 gal. of gasoline per 1000 cu. ft. Mr. Glick has made an exhaustive study of this growing industry with a view to its possibilities as a relief to the situation caused by the ever-increasing demand for gasoline. First part of this article appeared in THE AUTOMOBILE for Nov. 2.

THE question of the origin of the mineral substances petroleum and natural gas has long engaged the attention of chemists and naturalists. The theories propounded are divisible into two classes, firstly, those ascribing to them an inorganic origin and secondly, those which believe them to be organic decomposition products. It is well known that when water acts on carbides, i.e., compounds of metals and carbon, various hydrocarbons are liberated, the best known example being the formation of acetylene from calcium carbide. Chemists like Berthelot and Mendeleff were staunch supporters of the inorganic theories founded on observations of the nature of the preceding example. On the other hand, there is an extensive and overwhelming mass of evidence which seems to prove that petroleum and natural gas are produced by the decomposition under natural conditions of matter of both vegetable and animal origin. As examples of this sort of evidence it is known that on distilling menhaden (fish) oil a petroleum-like liquid is obtained, while on the Swedish coasts petroleum is found as a decomposition product of seaweed under ordinary atmospheric conditions. In what state the product we know as natural gas exists in the earth is a point not yet definitely settled, but from a consideration of the temperatures and pressures of liquefaction of its constituents it seems highly probable that it exists in the earth's strata in the gaseous state, as the temperatures prevailing there are not low enough nor the pressures high enough to keep it liquefied.

## Gas Consists of Paraffin Hydrocarbons

Chemical analysis has shown this gas to consist almost entirely of a mixture of the paraffin series of hydrocarbons, the lowest members methane and ethane predominating. Both these compounds are gases at the ordinary temperatures, methane having a boiling point of  $-160^{\circ}\text{C}$ . and ethane  $-93^{\circ}\text{C}$ . Associated with these are varying amounts of the higher members propane and butane, gases with boiling points of  $-45^{\circ}\text{C}$ . and  $1^{\circ}\text{C}$ . and pentane, hexane and heptane, liquids with boiling points of  $36.4$ ,  $68.9$  and  $98.4^{\circ}\text{C}$ . These higher liquid members are retained in the gas just as moisture is retained in the atmosphere and the amounts present depend on the same factors, temperature, pressure, and the intimateness of contact between gas and liquid. In the case of natural gas there is an added factor due to the varying composition of the liquid phase of the system, namely the percentage of low boiling fractions in the oil with which it is associated, for if the oil is high in these it is natural that the gas in contact with it should abstract a relatively larger amount of them. According to its composition natural gas is divided into two varieties, "wet" or casing head gas, and "dry" gas.

By wet gas is meant gas rich in the higher gasoline-yielding members, pentanes, hexanes, etc., usually a gas occurring along with oil and containing from 60 per cent and upward of these compounds. Dry gas consists mainly of methane, varying in amount from 50 to 95 per cent. This variety of gas is very rare in oil fields but common enough in gas fields, the Hogshooter field in Oklahoma yielding a gas which is almost entirely methane. The interest in this distinction lies in the fact that only wet gas is suitable for the production of gasoline by compression and condensation methods.

The manufacture of gasoline by compression and condensation is essentially a physical process. The paraffin hydrocarbons, as their name implies (parum, little, affinis, affinity), are very inert substances and as they are fully saturated compounds, the likelihood of chemical action merely on the application of pressure and cooling is exceedingly remote.

## Physical Properties

In order to understand the methods of manufacturing gasoline from natural gas under consideration, one should have some idea of the physical properties of gases. The gaseous, liquid and solid states are common with few exceptions to all substances, the particular state in which they exist at any time being determined by the temperature and pressure then prevailing. Thus at atmospheric pressure we know that ice, water and steam are different states of the same substance, the particular state depending on the temperature. All known gases when exposed to certain conditions will pass from the gaseous to the liquid state and vice versa. These conditions, however, must be observed before liquefaction can be brought about.

For example, take the case of methane, the main constituent of dry gas. If we attempt to liquefy this gas by compression at any ordinary temperature no amount of pressure will succeed in doing so, and this is true for all temperatures above  $-82^{\circ}\text{C}$ . At this point a pressure of 55.8 atmospheres or 837 lb. to the square inch will liquefy it. This temperature above which it is impossible to liquefy a gas is called the critical temperature and the pressure necessary to liquefy it at that temperature is the critical pressure. Every gas has its own particular critical constants and if we wish to liquefy any gas by compression we must make sure the temperature is below the critical point. Once below this critical point the pressure necessary for liquefaction depends on the vapor pressure exerted by the gas at the temperature used, and this becomes less and less the further we get below the critical temperature.

Another theoretical consideration has to be taken into account also. If we exert a pressure on a mixture of gases the pressure on any individual gas in it is proportional to its



percentage of the whole. Thus if a natural gas contains 20 per cent of gasoline vapors and we exert on it a pressure of 250 lb. per square inch, only 20 per cent of that pressure, namely 50 lb., is being exerted on the gasoline vapors themselves.

Bearing these principles in mind, let us apply them to natural gas and see what are the possibilities of liquefying its constituents.

#### Vapor Pressure a Determining Factor

The critical temperatures of all except methane are above atmospheric temperature, so methane is ruled out with all the others as possibilities, the vapor pressures at the temperature of cold water around 10 deg. C. being the determining factors now. These are as follows:

Vapor pressure (lb. per sq. in.), approximate—Ethane, 250; propane, 104.4; butane, no figures available; pentane, 5.4; hexane, 1.5; heptane, 0.4.

Temperature—Ethane, 10°C.; propane, 12.5°C.; pentane, 10°C.; hexane, 10°C.; heptane, 10°C.

Thus with a gas composed of 100 per cent ethane it would be possible at a temperature of 10 deg. C. to liquefy it by a pressure of around 250 lb. With a gas containing the more normal amount of 50 per cent, a pressure of 500 lb. would be necessary and as such pressures are never used, ethane is not liquefied. With 30 per cent propane, around 350 lb. would be necessary and as this pressure is sometimes attained, some propane will be liquefied. With the higher members even 5 per cent of pentane only requires 108 lb. for liquefaction and 2 per cent of hexane and heptane require only 75 lb. and 20 lb. respectively. Thus using cold water as the cooling agent and pressures up to around 350 lb. per square inch we may expect to find in the condensate propane and the higher members in liquid form. Dissolved in the liquid will be quantities of the gases methane and ethane as they are soluble in the liquid hydrocarbons in amounts varying directly with the pressure employed. Now, suppose one had condensed such a liquid at 350 lb. pressure, what would be the effect of exposing it to atmospheric conditions? The boiling points of the various liquefied paraffins are as follows:

Propane, -45°C.; butane, 1°C.; pentane, 36.4°C.; hexane, 68.9°C.; heptane, 98.4°C.

The average temperature of the atmosphere may be taken as 20 deg. C. (32 deg. C. in summer and 4 deg. C. in winter.)

#### Pressure Must Not Be Too High

Since propane and butane are gases under atmospheric conditions they would volatilize immediately from the liquid and in doing so would carry along with them part of the liquefied hydrocarbons, pentane, hexane, and heptane, just as on boiling water, the air escaping takes water vapor with it. Moreover, the methane and ethane dissolved in the liquid at 350 lb. could not be held in solution at atmospheric pressure (15 lb.) and they would therefore escape taking with them more of the true condensate. From this we see that by using too high a pressure in condensing we get a very unstable condensate. We realize then that the conditions to aim for in working are such that the liquid condensate produced should contain just as much of the lower members as can be retained by them under ordinary atmospheric conditions.

Since the composition of the gas used is the most important factor in the success or failure of a gasoline condensation plant, the testing of its suitability for this purpose is highly important. An ordinary eudiometric analysis such as is usually given is of little value in determining the amount of condensable vapors present, for it is impossible by this means to identify the amounts of each individual constituent.

Interesting work along these lines, however, has been done by the Bureau of Mines by liquefying the gas with liquid air and fractionally distilling the liquid in vacuo at different temperatures. One of the most valuable tests employed is

#### SPECIFIC GRAVITIES AND ABSORPTION NUMBERS OF SAMPLES OF NATURAL GAS USED FOR MAKING GASOLINE

Situation	Specific Gravity		Absorption No.
	Air = 1		
Follansbee, W. Va.....	1.46	86	
Follansbee, W. Va.....	1.41	84	
McDonald, Pa. ....	1.03	39	
McDonald, Pa. ....	1.59	43	
Kiefer, Okla. ....	.83	23	
Follansbee, W. Va.....	1.38	65	
Riverside, W. Va.....	1.37	48	
Riverside, W. Va.....	1.38	44	
Steubenville, Ohio .....	1.21	54	
Steubenville, Ohio .....	1.00	37	
Glen Pool, Okla.....	1.15	55	
Glen Pool, Okla.....	1.43	78	

based on the fact that natural gases are soluble in various solvents in volumes directly proportional to the amounts of higher gasoline producing hydrocarbons present. The solvents generally employed are claroline oil (a mineral oil distillate, specific gravity 0.8667 flash point by Pensky Martens closed test 152 deg. C., ignition point 270 deg. C.) or alcohol, and the gas should be soluble to the extent of 30 per cent or more by volume as determined by agitating 100 cm. of the gas with 35 c.c. of the former or 50 c.c. of the latter. In a further test advantage is taken of the wide variation in specific gravity of the constituent members of the gas. Methane has a specific gravity of 0.554 (air = 1), ethane 1.049, propane 1.520, butane 2.01, the still higher homologues increasing rapidly.

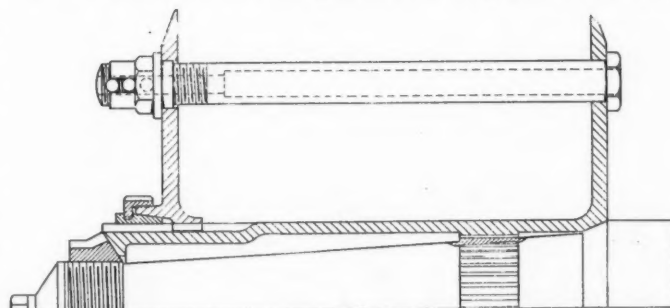
#### 0.80 Lowest Gravity Limit

From these figures it will be seen that just as in the case of the absorption number, the specific gravity of the gas increases directly with the percentage of gasoline producing constituents, and it has been found advisable to fix 0.80 as the lowest limit for a gas to be used on a commercial scale. The determination itself is simple, a glass bulb being weighed full of air, when exhausted, and full of the gas to be tested, the ratio of the weights of these equal volumes of gas and air giving the specific gravity. While these two tests give a fair line on the value of the gas, it has become customary to amplify them by trying out the gas practically with a small compression apparatus put up for the purpose by many of the firms supplying compressors for the actual plants.

These gases give on condensation from 1 to 4 gal. of gasoline per 1000 cu. ft., any gas giving less than  $\frac{3}{4}$  gal. per 1000 cu. ft. not being considered rich enough for commercial exploitation.

This industry will certainly produce during 1916 well over 100,000,000 gal. of "casing head" gasoline and will come on the market as a blend with various petroleum distillates. The total volume sold as a motor fuel will be in the neighborhood of 200,000,000 gal., which at 20 cents a gallon will be worth \$40,000,000.

#### Detachable Aeroplane Propeller Hub



At the first meeting of the Aeronautic Engine Division of the Society of Automobile Engineers Standards Committee, Howard E. Coffin suggested that a quick-detachable propeller hub could easily be made on the principle of the detachable automobile wheel. The illustration at the right shows a British patent recently granted to the Rolls-Royce Co. It will be seen that the hub is closely similar to that used for the Rudge-Whitworth detachable wire wheel.



# The F O R V M



## Wants Lower Second Gear

By O. B. Parkinson.

THE writer has driven automobiles of various makes in California mountains for 14 years, and over every condition of road which can be found in California, and from his own experience, and that of hundreds of others whom he has met in his travels, is thoroughly convinced that 90 per cent or more of the cars manufactured in the East, and sold in California, are not as well adapted to use in California as they could be with the proper understanding on the part of the makers of gear ratios as applied to road conditions here. If this is true, then the fact that California is well up to the top of automobiles registered, should interest the car makers to the extent of giving the subject due consideration. A few have done so. Many of the makers have changed their low speed gear ratio for lower ratios, and there stopped, with the idea that having geared the car low enough to climb the California mountains on low gear, that is all that is necessary.

A few years ago for an average four-cylinder touring car of 30 hp., the high speed ratio was 3.5, the second was 6.25, and the low, 11.2 to 1. This produced at a maximum engine speed of 1200 to 1500 r.p.m., a car speed on high gear of from 50 to 60 m.p.h. on second, about 20 to 25 m.p.h., and on low, from 10 to 15 m.p.h.

### Low Gear Too High

For grades exceeding 25 per cent on rough mountain roads, of which there are many in California, the low gear was not sufficiently low. In order to negotiate such hills successfully, a maximum engine speed must be developed which resulted in damage to the car, and discomfort to its occupants.

The modern cars have a high speed gear ratio for ordinary stock cars, ranging from  $3\frac{3}{4}$  to  $4\frac{1}{2}$ , with a second gear of from 6 to 7, and a low gear of about 13 to 14 to 1; one light car having a ratio of 16.8. These low gear ratios should be ample for any car. Take the average car with the  $4\frac{1}{2}$  : 1 high gear, its maximum car speed is about 45 to 50 m.p.h.; on its second speed it will develop a car speed at a maximum of about 30 m.p.h.; with its slow speed it has a maximum car speed of approximately 10 to 12 m.p.h.

### No Real Intermediate Speed.

Now, it will be noted that in these cars the second gear, is only about 2 or 3 ratios lower than the high speed gear, while the gap between this intermediate gear and the low is 6 to 8 gear ratios. This, on the face of it, looks strange, and unless there is a good reason for it, is absurd. If there is a good reason, we have failed to find it, on the contrary, from the writer's own experience and the experience of others with different makes of cars, it is a fact that on rough mountain roads with many of the popular makes of cars, that a grade which cannot be negotiated on high speed, cannot be negotiated on second, and the operator is obliged to drop back to low gear.

### Could Easily Be Changed

With a reasonably low second speed, he should negotiate all grades up to 18 or 20 per cent on second, and at a car speed of 10 to 12 m.p.h. (which is as fast as the average mountain road should be traveled).

It is not only in ascending hills in which a lower second

speed is required, but in descending them as well. We have many California roads where the hill is from 5 to 10 miles long with grades ranging from 5 to 15 per cent, where the conditions are such that to travel down hill on high gear is dangerous, to use the usual second speed is but little better, and to travel on low gear is too slow. A lower second gear, which is really an intermediate, that is midway or nearly so between the high and the low, is a great advantage.

If there is anyone who can advance any good reason why a car should be geared in the proportion 4, 6, and 16, for the use of the average tourist, I should like to hear it. There is no question but that many cars which have failed to make good in the mountains of California with the resultant loss of sales, could be changed easily to fit all the requirements of the drivers in mountain work.

## What Is 100 Per Cent Grade?

By Chas. E. Manierre

THERE is quite generally a confusion of terms in describing road grades. Occasionally one makes use of the angular difference between the horizontal and the grade correctly describing it as 3 or 5 or other degrees, in which case he means 3 or 5 or other degrees of arc, as shown in the first of the small diagrams.

Unfortunately the word "degree" in its wider meaning can be applied in connection with the other two modes of indicating grade, although of course erroneously. The surveyor's and engineer's method of describing grade is so many feet in 100, the hundred being measured along the level and the amount of elevation at right angles thereto.

### Automobile vs. Surveying Terms

In each of the small diagrams the distance from A to C is the grade of the road and the line or distance between A and B is horizontal. In the second diagram the road grade is not drawn, so that the lines used by the surveyor may stand out more prominently. The base, A — B is generally taken at 100 ft. and the perpendicular, B — C is the number of feet of rise in the hundred. The surveyor's expression is 5 ft. in 100, 10 ft. in 100, etc. When the rise reaches 50 in 100 it may be described as 50 in 100 or 1 in 2, and similarly, when it reaches 100, it may be described as 1 in 1. A still steeper grade would be represented by 2 in 1. Those who have had anything to do with land matters know that practically all of the surveyor's work is reduced to the horizontal, and in fact even when he is chaining up a hill, his chain is always held level.

For those in any way interested in the automobile, whether in driving, designing or manufacturing, it is the distance along the grade that is measured and compared with the vertical, as shown in the third of the small diagrams, in which A — C is deemed to be 100 ft. and C — B is the vertical rise, and the two are expressed as percentage. If B — C equals



Fig. 1—Diagrams illustrating how the civil engineer contrasts the base of the right angle triangle with the vertical, while the automobilist contrasts the hypotenuse of the triangle with the vertical



three, the grade is a 3 per cent grade. If it equals 5 or 10 it is a 5 or 10 per cent grade, and so on. In other words, the engineer contrasts the base of the right angle triangle with the vertical, while the automobilist contrasts the hypotenuse of the triangle with the vertical.

The larger diagram shows the three methods of describing grade in a single drawing, so that the relation between angles, per cent and rise in the hundred may be apparent, showing the interchangeable values of a number of grades, as expressed in any of the three ways.

### Three Methods of Describing a Grade

The line A — F is approximately the steepest grade that an automobile is expected to ascend. Very few can do better and many will not reach it. An engineer would describe it as 60 in 100. It is also properly to be described as a 50 per cent grade, because the perpendicular drop from the point K is exactly half the length of the line A — K, and it can also properly be described as a grade which makes with the horizontal an angle of 30 deg. of arc.

The 45 deg. line, from A to L is drawn as a matter of interest, because, from an engineer's standpoint, the horizontal distance and the rise being equal, it is properly described as 1 in 1 or 100 in 100 and it is very improperly described as a 100 per cent grade, which it is not. It is, in fact, approximately a 71 per cent grade. It should be here said that the degrees are only approximately correct, and this is true also of all the figures relating to the grades of 5, 10 and 15 per cent, the errors being too slight to be noted.

### 45 Deg. Not Really a 100 Per Cent Grade

The absurdity of calling the 45 deg. grade a 100 per cent grade is brought out by considering that it is perfectly possible to have steeper grades, as for example railroad embankments, so that one would proceed to 150 and 200 per cent grades, and at the point where the slope merges into the perpendicular, under this system of nomenclature, the grade becomes infinite.

On the other hand, there are very strong reasons for applying the per cent term to the grades that are designated by measuring along the slope and comparing that with the perpendicular. The horizontal is, of course, a zero grade. As the perpendicular is approached the grade per cent increases to 90 per cent and above, but at the point where the perpendicular is reached, the grade is 100 per cent. In other words, it is all grade and no horizontal advance.

### Should Measure Grades in Per Cent

There is also the additional reason for using the per cent term, that where the weight of a vehicle is expressed in tons of 2000 lb., each rise of one per cent of grade requires an addition of 20 lb. of engine torque per ton to overcome it. That is to say, if a car is proceeding on the level and comes to a 10 per cent grade, its reserve torque must be at least 200 lb. per ton to carry it up the grade. If the grade increases to 15 per cent an additional 100 lb. is needed, and so on.

Fortunately for the average owner the practical difference between 15 per cent and 15 in a hundred and any lesser grade is too slight to take into account, and on the main highways a grade exceeding 15 per cent is scarcely ever met with. It is said that the grade up Pike's Peak does not exceed 10 per cent at any point. Occasionally on back roads 20 per cent or 25 per cent grades may be encountered, but in those cases it is frequently the bad character of the road bed that troubles the driver quite as much as the steepness, or degree of incline, of the road.

### Take 7 or 8 per Cent Grades on High

The average automobile, if in good condition, should be able to surmount a 7 or 8 per cent grade on high gear. The effect of reduction to low gear and the enormous increase in

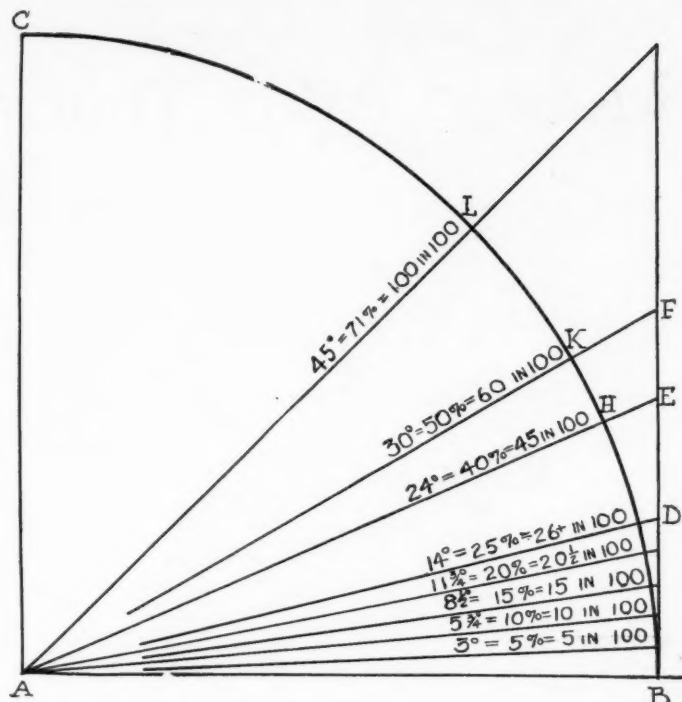


Fig. 2—Three methods of describing grade in a single drawing so that the relation between angles, per cent and rise per hundred feet may be apparent, showing the interchangeable values of a number of grades as expressed in any of the three ways. The line A-F is approximately the steepest grade an automobile is expected to climb

reserve torque applicable to the surmounting of hills are illustrated when one multiplies 40 or 50 per cent of grade by the 20 lb. for each per cent of rise and finds that for the weight of his car in tons the engine must furnish on account of grade alone 800 to 1000 lb. respectively of energy, a very considerable expenditure.

### Confusing to the Car Buyer

It may be noted also that so long as the terms descriptive of grade are confused, the purchaser may do injustice to the manufacturer who claims an ability in his car to climb a 50 per cent grade, if his mind is taken up with the idea that it is a grade of 50 in a hundred, whereas the claim is 60 in a hundred and the engine power proportionately larger. On the other hand, if the manufacturer claims an ability of his car to climb a 60 per cent grade and what he means is 60 in a hundred, the purchaser may erroneously believe that he is claiming for his car the extraordinary ability to climb a real per cent grade, requiring the putting forth of 1200 lb. per ton of torque for the sole purpose of overcoming grade alone, a claim which would be apt to discredit the rest of the statements made with respect to the car, although they might be really true.

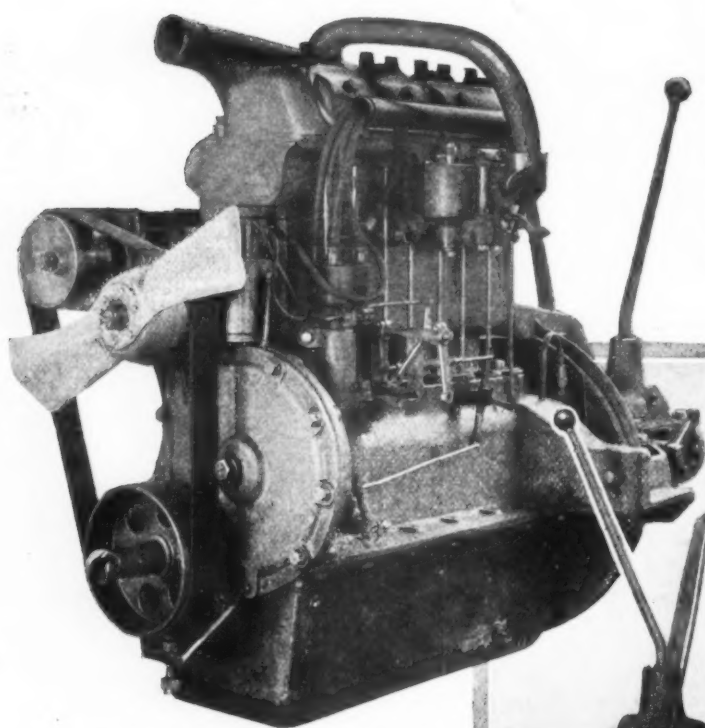
It is to be hoped, therefore, that both makers and users of cars will differentiate between so many feet in a hundred, the engineer's terms for grade, and per cent grade, which has to do with gravitation and which is so intimately connected with engine ability.

### Transverse Tables Aid in Solving Problems

For the convenience of anyone who may wish to make further comparisons of the three ways of expressing grade, it may be suggested that the tables, used by all seamen and surveyors, showing angle, distance, latitude and departure, and known in surveying as Traverse Tables, will quickly furnish them the means of solving all the triangles, these tables having the elements of all possible right angle triangles set down with a sufficient degree of accuracy for the purpose of calculation and comparison.

# Monroe Adds Touring Car

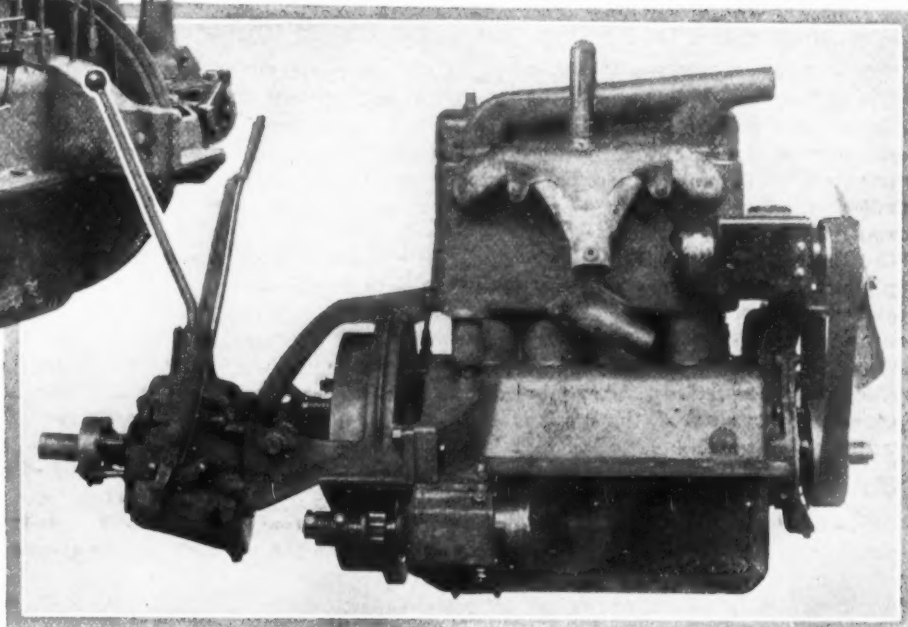
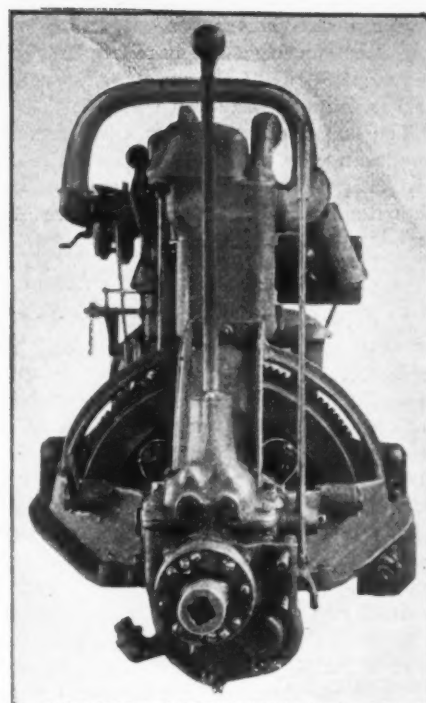
New Car Has 115-In. Wheelbase, Overhead Valve Engine with Detachable Cylinder Head  
—Dry-Plate Clutch and Cantilever Springs



The view of the engine shown above gives an idea of the belt drive used for the two-bladed aeroplane-type fan and the generator. Ignition unit drive and high mounting of carburetor are also illustrated

At the right is the exhaust side of the engine, illustrating the liberal exhaust manifold, generator and starter motor mounting and Bendix drive of latter

At the right is a rear-end view of the four-cylinder block unit power plant used in the new Monroe touring car. Note attachment of gear-set and hot-air carburetor connection



**M**ONROE cars have hitherto been made only as roadsters, but the Monroe Motor Co., Pontiac, Mich., has now added a touring model. The new car, designated as model M-4, is a roomy 115-in. wheelbase vehicle with the modern straight-line center cowl effect, and embraces the latest in construction ideas, particularly in the frame, which is the deep-section design in which the mud aprons and running boards are part of the structure.

Everything about the car is very much in line with the latest tendencies. The overhead valve engine, detachable cylinder head, big valves, dry-plate clutch, slanting windshield and cantilever springs are a few of the high spots chosen at random to illustrate that the latest practice in everything has been studiously followed in this moderate-weight touring car which is to sell for \$985 f.o.b. Pontiac, Mich.

Even a casual inspection of the power plant will disclose its high-speed characteristics. The ports are large and the

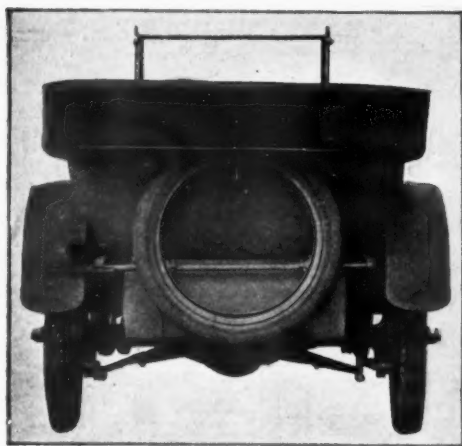
overhead valves are carried directly in the head. There are no sudden bends in the gas passages as the intake manifold is integral with the engine head.

The cylinder block is cast integrally with the upper part of the crankcase. It is of gray iron. The dimensions of the cylinders are  $3\frac{1}{4}$  by  $4\frac{1}{2}$  in., giving a piston displacement of 150 cu. in. The entire combustion chamber is exposed by the removal of the upper part of the engine formed by the head casting, and the valves are also very accessible, as the push rods are carried down on the outside, and there is also no difficulty in reaching them from above by removing the nuts from the top.

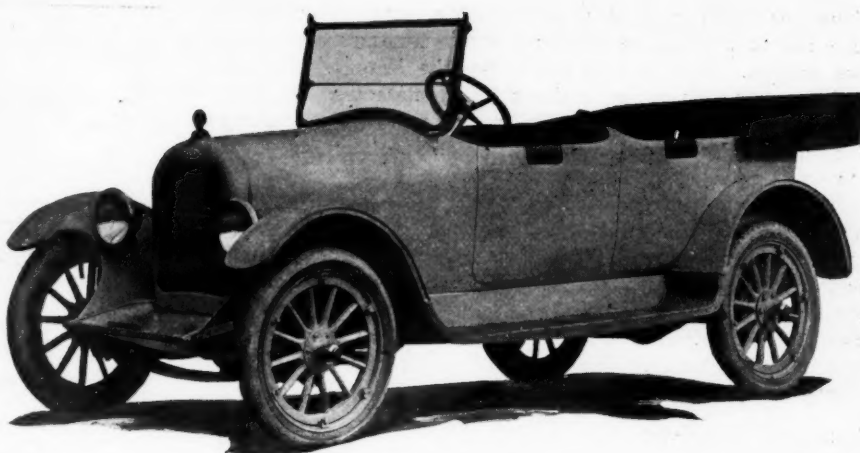
A two-bearing crankshaft is used with two large babbitt-lined bearings. The front bearing is  $1\frac{1}{4}$  in. by  $2\frac{7}{16}$  in. in diameter and length and the rear bearing is  $2\frac{1}{4}$  in. diameter by 3 in. length.

Force-feed lubrication is used with a hollow crankshaft through which a gear pump, driven off the camshaft, forces

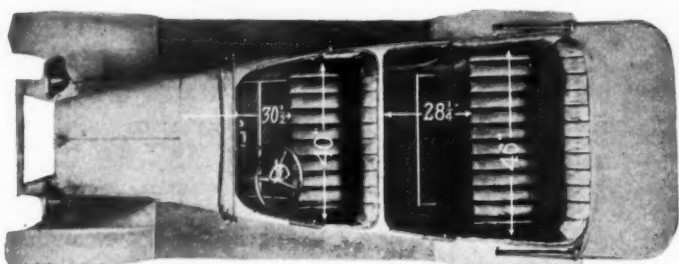




Rear view of the new Monroe touring car, showing platform spring. Plan appears below



The new Monroe four-cylinder, five-passenger touring car, which sells for \$985, f.o.b. Pontiac, Mich. It has a 115-in. wheel-base, and uses 32 by 4-in. tires



the oil to all bearings. There is a pressure gage on the dash which indicates at all times when the system is working. Carburetion is taken care of by a Zenith instrument and ignition by the Connecticut system driven off the camshaft. Both the carburetion and ignition are very simple, as far as the driver is concerned, the carburetor having a fixed adjustment which need not be altered after the car has left the factory. The gasoline tank is carried at the rear of the chassis frame, and has a capacity of 14 gal. The feed to the carburetor is by gravity from the Stewart vacuum feed tank.

Starting and lighting is accomplished by a two-unit Auto-Lite system in which the generator is belt-driven while the starting motor engages with the ring gear on the flywheel by means of a Bendix attachment. The battery is a Willard. This gives a very compact electrical layout and the same idea of clean-cut electrical mounting is noticeable in the ignition where the coil and timer-distributor are side by side. This cuts the length of the high-tension leads, lessening the electrical loss through leakage and resistance.

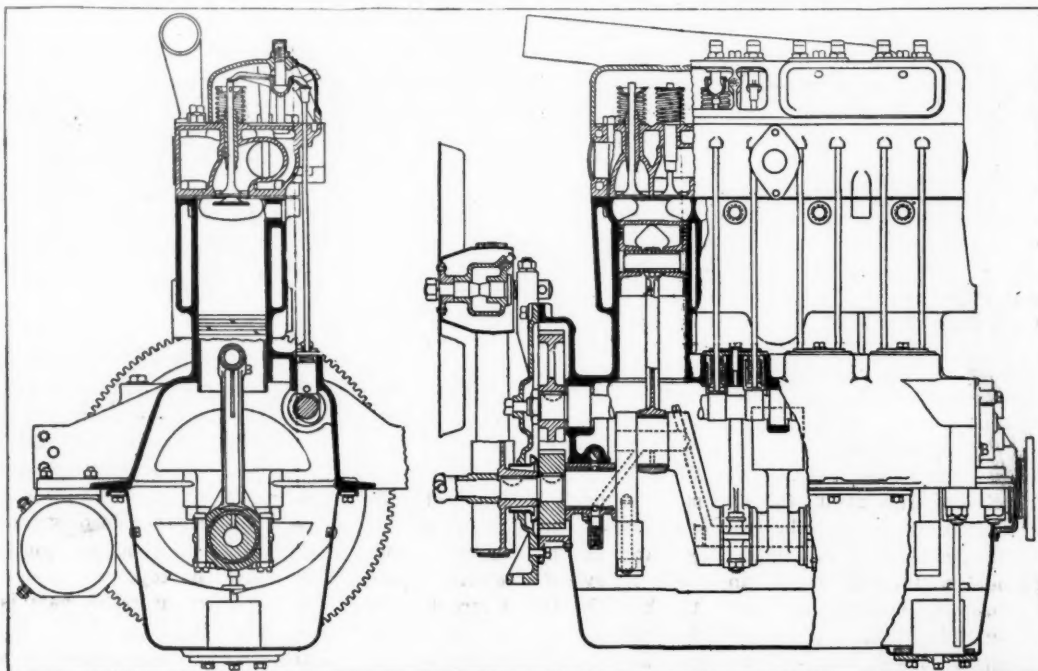
A multiple-disk clutch having six dry plates is used to transmit the power from the engine. The clutch is housed within the flywheel and transmits the drive through a facing of Raybestos against steel.

From the clutch the drive passes through a three-speed gearset which is a part of the unit power plant formed by engine, clutch and gearbox. The materials used in the construction of the gearset are chosen for their rigidity and the gears are made of double heat-treated nickel steel. Ball bearings are used for the main and counter shafts.

#### M. & S. Differential Used

Two universals are used on the drive shaft and the rear axle is a floating design with a pressed-steel housing and axle shafts of alloy steel. The axle housing is reinforced by the insertion of nickel-steel tubing. The pinion and ring gear are spiral bevels and a factor in the lightness of the axle is in the keying of the rear wheels directly to the outer ends of the live axle shafts. The reduction in the rear axle gives a clew to the high-speed characteristics of the engine, as it is 4½ to 1. Another feature of interest is in the use of the M. & S. differential as stock. This differential is noted because of the fact that it gives traction on both wheels.

The wheels are artillery type, with twelve spokes. They are made of selected hickory and have spokes of 1½ in.



Sectional view of the four-cylinder, high-speed block unit power plant employed in the new Monroe touring car. It has a bore of 3¼ and a stroke of 4½ in., giving a piston displacement of 150 cu. in., and the valves are carried directly in the head. The cylinder block is cast integral with the upper half of the crankcase

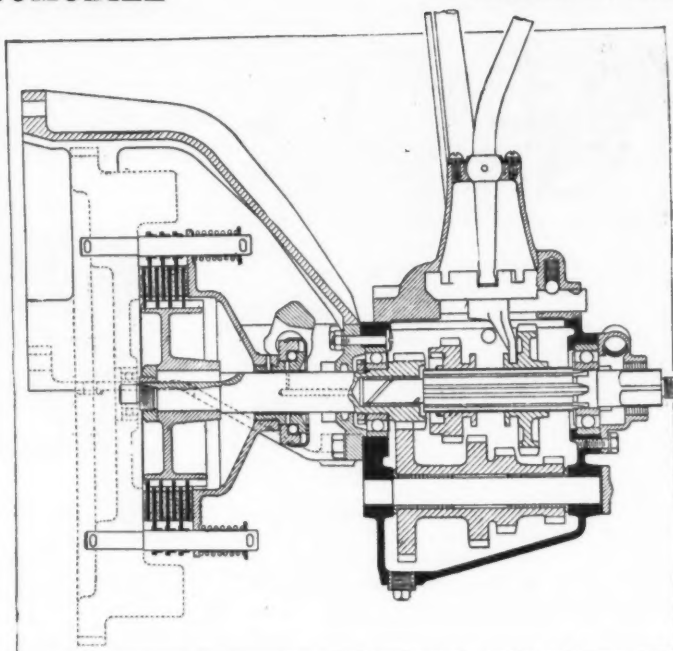
They are fitted with Q.D. demountable rims. Wire wheels can also be secured for the Monroe cars at extra cost if they are desired. The rear wheels carry the brakes, which are double, acting on a single drum 12-in. diameter. The face width of the brake is  $1\frac{1}{4}$  in. and the lining is asbestos fabric. Non-skid tires are furnished on the rear wheels and the tire size is 32 by 4 in. all around.

In the structural part of the frame, the general layout of the Brush deep-side member arrangement is used. The longitudinal members are 6 in. in depth, with the steel running boards, hot-riveted to the side members, forming part of the frame. This design makes it unnecessary to use heavy sills for the body and also does away with the step hangers and the side shields. The entire assembly has the effect of strength with minimum weight.

#### Compound Cantilever Rear Springs

Compound cantilever rear springs are used, mounted across the rear of the chassis. This type of spring, which is a rather novel type, is noted for its elimination of side sway. In the Monroe application it is fitted throughout with self-lubricating shackles which tend to reduce the necessity for frequent attention and also add to the life of the parts and produces quietness. Semi-elliptic springs of the conventional type are in front.

A full five-passenger capacity is given by the body. The upholstery is in machine-buffed leather and a double cowl effect is secured in the molding of the back of the front seats. The doors are given an added touch by the use of leather flaps. As a comfort feature the upholstery is lined with curled hair and is mounted over cushion springs. Carpet is placed in the rear tonneau and there is space under the front seat for the jack, pump and heavy tools. All the doors have pockets, the front left-hand door being made to carry an assortment of small tools. The finish is in standard black with nickel trim. The fenders are crowned with curved steel running boards having metal-bound lineoleum pads.



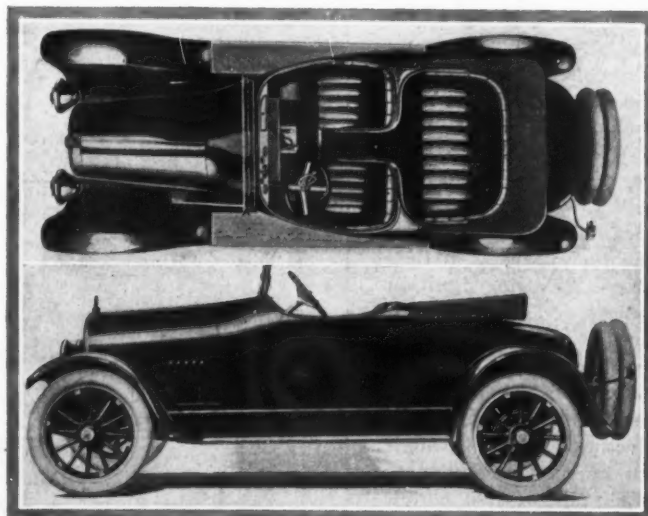
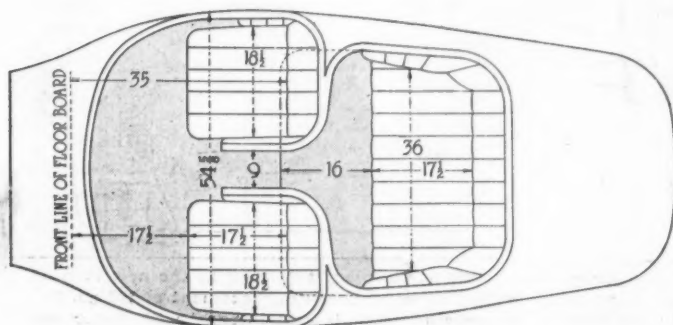
Section through the three-speed-and-reverse gearset used in the new Monroe touring car. Rigidity is a feature of this unit and the gears are of double heat-treated nickel steel. Ball bearings are employed for the main and counter shafts

The windshield is sloping with the glass overlapping to eliminate rain leakage.

For a color choice the Monroe company offers royal blue with cream or red wheels. The finish of the metal work is black, as stated. Full equipment is sold with the car, this including besides the accessories mentioned, a heavy rubber one-man top, Collins curtains, electric horn, extra rim and carrier, Connecticut lock switch, Stewart-Warner speedometer, muffler cut-out and complete set of tools.

## Westcott Four-Passenger Cloverleaf Roadster

LARGE and comfortable seats are one of the leading features of the new four-passenger cloverleaf roadster recently brought out by the Westcott Motor Car Co., Springfield, Ohio. The seating arrangement in this model has been designed to provide maximum comfort for four passengers. Entrance to the rear compartment is through an aisle 9 in. wide between the front seats. This permits passengers to change from one compartment to another without interfering with the driver and also insures a pure circulation of air to the rear seat after it is forced to the floor in front of the driver through the double ventilating windshield. This body is mounted on the standard Westcott 125-in. wheelbase chassis. Dimensions are given in the diagram below.



The side view and plan of the new Westcott four-passenger cloverleaf roadster appearing above give an excellent idea of the lines and general appearance of this model, which has a smooth exterior and fenders conforming closely to the contour of the wheels

At the left is a plan diagram giving the dimensions of the seating arrangement



# ACCESSORIES

## Moore Steering Gear

THIS steering gear head was designed to overcome lost motion or backlash by providing against wear in gears of the worm and sector type. Its construction is evident from the illustration, the two parallel levers *A A* rigidly connecting with the shafts of the sectors *C*. These sectors engage the worm *D* which operates them, the right and left threaded locking screw *B* serving to draw the levers *A A* together or to separate them. By this means the teeth of the sectors may always be kept in contact with the worm, thereby preventing lost motion. When the levers are drawn together the wear comes on one side of the teeth and, when apart, on the opposite side.

Thus the mechanism may be kept in perfect adjustment and all lost motion eliminated until the teeth of the sectors are worn to a knife edge and are no longer strong enough to do the work required of them. One of these gears has been in use for 5 years, frequent adjustments being made always in the same direction and no fault has developed. By the use of the two sectors *C* twice the number of teeth in the gears and double the number of threads of the worm are brought into play giving double the worm service.—V. M. Moore, 5046 Lakeside Avenue, Cleveland.

## Dean Knife Timer for Fords

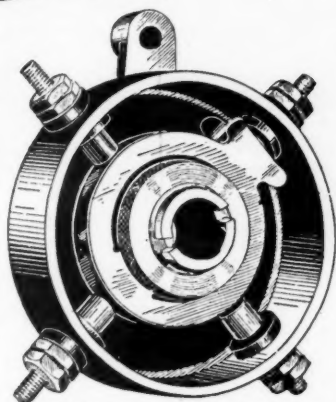
An ignition timer for Ford cars. The contact is made by two tempered steel knives passing over both sides of a tempered distributing terminal, not coming in contact with any other substance or metal. The shell is made of a special metal and is insulated to eliminate short-circuits. The timer is said to facilitate starting in cold weather and to never need cleaning. Price, \$1.75.—Tisch Auto Supply Co., 215 Division Avenue, South, Grand Rapids, Mich.

## Line Carburetor Heater

A heating coil operated from storage or dry batteries heats the carburetor in this device. The coil is clamped around the bowl of the carburetor and is controlled by a switch on the dash. By closing the circuit heat is generated, causing the gasoline to volatilize more readily, aiding easy starting. Price, \$3, complete.—Mechanical Utilities Corp., 5 North La Salle Street, Chicago, Ill.

## Pennsylvania Bar Circle Tire

Bar Circle non-skid tires have treads of tough black rubber formed into a



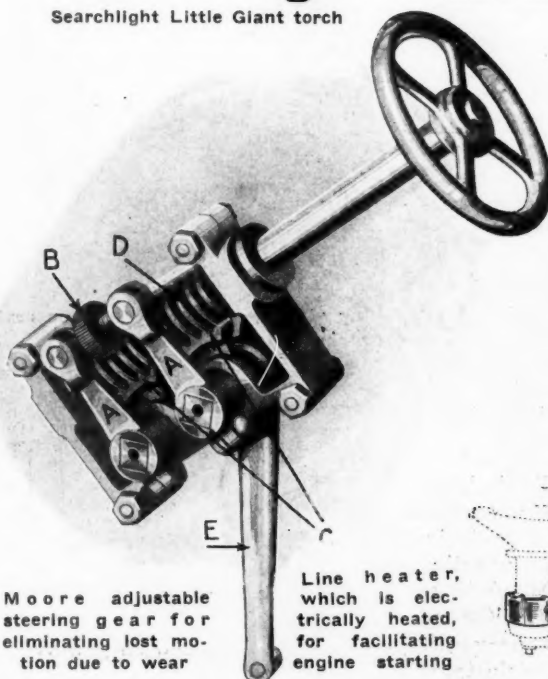
Dean Knife timer for Ford cars



Universal angle plate for holding work in any position on a machine



Searchlight Little Giant torch



Moore adjustable steering gear for eliminating lost motion due to wear

Line heater, which is electrically heated, for facilitating engine starting

combination of cross-bars and circles. This construction is claimed to put the rubber where it is most needed and to enable the tires to exceed their guaranteed mileage under normal conditions. Prices of some popular sizes are:

Size	Price	Size	Price
30 x 3.....	\$10.35	34 x 4.....	\$22.50
30 x 3 1/2.....	13.45	36 x 4 1/2.....	31.80
32 x 3 1/2.....	15.45		

Of course, all other standard sizes are obtainable.—Pennsylvania Rubber Co., Jeanette, Pa.

## Toscot Belt Coupling

The Toscot is a detachable coupling for flat belts and the Victor for round belts. The former is used in 1 and 1 1/4 in. sizes for automobile work. Prices of the flat belt coupling run from 90 cents to \$2.80 per dozen, according to sizes, ranging from 1 to 6 in. The round belt coupling costs from \$2 to \$26 per dozen in sizes varying from 1/2 to 1 1/4 in.—Stewart & Co., New York City.

## Searchlight Torch

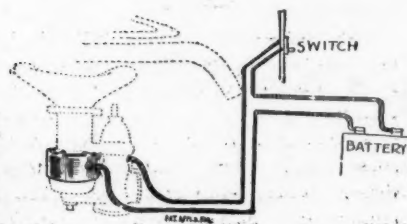
A brazing or soldering torch that may be attached to any automobile or motorcycle acetylene tank. An extremely hot flame is produced immediately and may be regulated to suit the requirements of the work. The device is small, provided with a convenient handle and may be used in a limited space. Price, \$1.50.—Searchlight Co., 415 Karpen Building, Chicago, Ill.

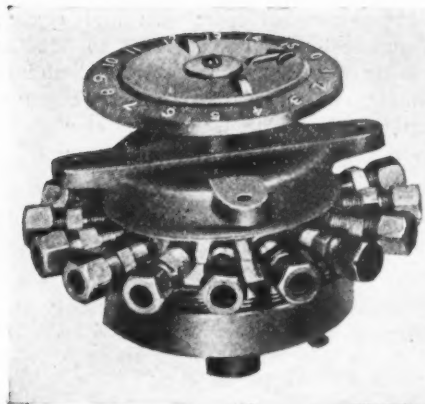
## Universal Angle Plate

The Universal plate holds the work in almost any position, either in a lathe, planer, milling machine, shaper, drill press, or grinder. A cast iron base is bolted to the machine tool, and carries a double adjustment standard supporting the semi-cylindrical table to which the work is clamped. This standard may be



Pennsylvania Bar Circle non-skid tire, showing distinctive non-skid tread





Monitor lubricator. Distributer illustrated at left is mounted under floorboards as shown at right. The device is designed to replace grease cups

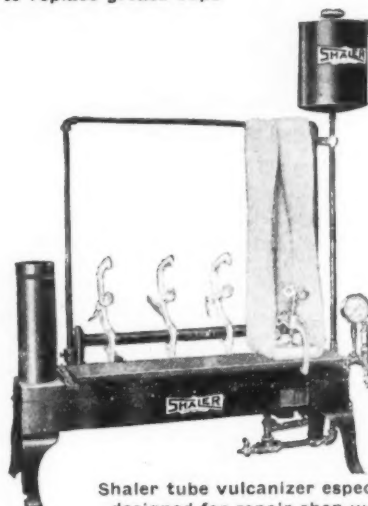
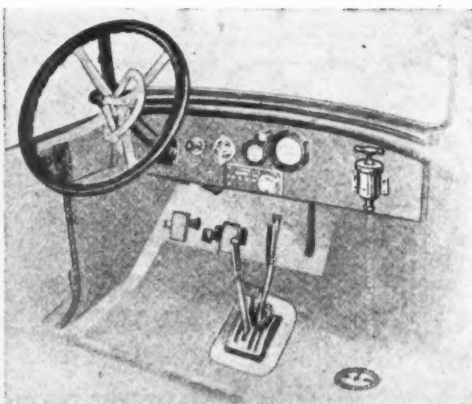
moved through 360 deg. horizontally, and work table may be swung through an angle of 90 deg., the amount each is moved being shown by a scale on the face of the adjusting members. It is said that the work is rigidly held, may be adjusted to any angle while bolted to the table, and is particularly adapted to tool room work. Price, 4 by 6 in., \$50; 6 by 8 in., \$75; 8 by 10 in., \$100.—Boston Scale and Machine Co., 381 Congress Street, Boston.

#### Monitor Lubricator

Grease cups are eliminated throughout the car, and all grease is supplied by an attachment which is mounted in the driver's compartment. The device consists of a grease gun which is fastened permanently on the cowl and which delivers grease to a distributor sunk in the floorboard. Pipes run from it to the various points on the car which require lubrication. The top of the distributor consists of a dial with numbers placed at points on its circumference, each one corresponding to some pipe running to a point requiring lubrication. If the pointer is turned to number 3, for example, and the handle on the grease gun is screwed down, grease might be delivered to the right front spring bolt. The delivery of the grease to the various points is claimed to be positive, and only occurs as the driver deems it necessary. The pipes running to the springs are carried along the frame side members and those running to the axles branch off from the frame and run along the springs. The pipes are sufficiently flexible so that the relative motion of the different parts of the car will not cause breakage. — Monitor Lubricating Co., 1218 Chestnut Street, Philadelphia, Pa.

#### Shaler Tube Vulcanizer

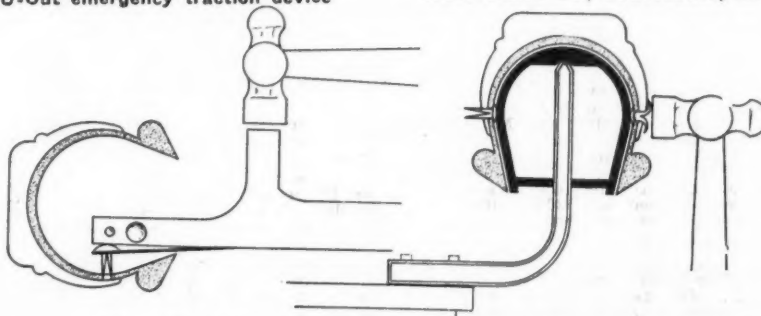
This vulcanizer is especially designed for repair shop use, the machine surface of the tube plate which is 4 1/4 by 24 in. standing 9 in. above the base, adapting it to installation either on the floor or work bench. This vulcanizer, like all Shaler types, embodies the automatic temperature control. The tube clamping



Shaler tube vulcanizer especially designed for repair shop work



Dig-U-Out emergency traction device



Star kit containing all tools required for riveting the tread of an old tire over another

device is also new, four clamps being provided, adjustable to any position along the plate, and instantly attachable to a tube. The entire length of the plate may be used for single long repairs or four tubes can be mended as quickly as one. Steam is generated to vulcanizing pressure in 15 min. and is maintained there indefinitely without attention from the operator by means of a thermostatic damper, which regulates the intensity of the flame produced by the gas or the gasoline burner. A steam gage and safety valve are fitted. The vulcanizer sells for \$25.—C. A. Shaler Co., Waupun, Wis.

#### Dig-U-Out

This emergency device provides extra traction. A metal paddle is clamped onto each rear tire when the roads are exceptionally bad or the car is stuck, and is said to enable a car to pull out of any mudhole. Price, single-tire size, \$10; dual-tire size, \$14.—Protex Co., 1790 Broadway, New York City.

#### Star Tire Retread Kit

This kit contains the tools necessary to rivet the tread of one old tire over another. It consists of three mandrels, a rivet set, fabric knife, pliers, can of cement, brush and clamp. The bead of one old shoe is removed and its tread is cemented over the tread of another old shoe having a good bead. The mandrels are then employed in driving the rivets from the inside and clinching them securely on the outside of the tread. Price, complete, \$8.—Star Auto Supply Co., Spokane, Wash.

#### Apco Ford Specialties

A set of valve grinding equipment including the Apco valve spring remover which keeps the springs compressed, permitting the use of both hands, a grinding tool that can be easily used on the fourth cylinder and a large box of carborundum grinding abrasive sells for 60 cents.

The company's improved clutch control throws the clutch into neutral when the brake pedal is used. This prevents the engine working against the brake and saves wear on the brake lining. The control is easily attached with a screw driver and wrench in a few minutes, no fitting being required. The manufacturer states that the control is of special value in congested traffic. It sells for 30 cents. —Auto Parts Co., Providence, R. I.



# Industrial Miscellany

## Factory

Ajax-Grieb Rubber Co., Trenton, N. J., is building a four-story brick and steel addition to its plant at a cost of about \$300,000.

Youngsville Radiator Co., Youngsville, Pa., builder of automobile radiators, will increase its capital stock from \$25,000 to \$50,000. The company now occupies 8600 sq. ft. of space, but will build probably next spring.

Motor Parts Co., Newcastle, Ind., is building an addition to its plant, 80 by 180 ft.

Reliance Motor & Tool Co., Toronto, Ont., has been formed to make tools and motor appliances. Incorporators are W. B. Sturup, J. S. Duggan and C. A. St. C. McKay, of Toronto.

Pilot Motor Car Co., Richmond, Ind., has work well under way on its new building, which it expects to occupy in three weeks.

Pull-More Motor Truck Co., New Castle, Pa., has broken ground for the erection of a new plant. The company is capitalized at \$800,000 and employs 300.

Boone Tire & Rubber Co. will establish a plant in Sycamore, Ill. It is expected to have tires on the market in February.

G. W. Childers & Co., manufacturers of steel casings for automobile tires, is locating its principal plant in Wichita, Kans.

M. E. Kern has bought land in Allentown, Pa., on which he will erect a plant for the manufacture of motor trucks.

Rogers & Madison Truck Co., Petersburg, Va., is planning the construction of a factory building to cost \$15,000.

Westgard Tire & Rubber Co., Warren, Ohio, will shortly begin the erection of the first unit of its new plant, which will be 100 by 240 ft., two stories and basement, and a power plant.

Howell Electric Motors Co., Howell, Mich., has increased its capital to \$100,000, and is preparing plans for an addition 40 by 100 ft.

Doehler-Die Casting Co., Brooklyn, has let the contract for a concrete and steel addition to its plant. It will be 50 by 100, seven floors, and will cost about \$150,000.

Wright Wrench & Forging Co., Canton, O., has disposed of its entire wrench and small tool business and the name has been changed to American Forge & Machine Co. The plant has been doubled in size and is now devoted exclusively to the manufacture of heavy drawn forgings up to 15 tons in weight and a line of motor car drop forgings. A heat treating plant has been added.

Lycoming Rubber Co., Williamsport, Pa., has started the erection of a large brick addition, 55 by 100 ft.

Marion Metal Products Co., Marion, Ind., has been formed to manufacture automobile accessories. The directors are W. E. Plummer, G. A. H. Shideler,

C. A. Williams, G. C. Condo and J. R. Browne.

Dall Motor Parts Co., Vermillion, Ohio, has been formed and will erect a building, 40 by 83 ft., to manufacture pistons and other automobile parts. W. E. Derr is president, and L. A. Dall, general manager.

Cutler-Hammer Mfg. Co., Milwaukee, manufacturing the C-H magnetic gear-shift and other electric controlling devices, switches, etc., will start work at once on the erection of a new administration building, laboratory and general industrial building, costing \$150,000. Plans have been completed and contracts awarded. The building will be 283 ft. long and 50 ft. wide, six stories and basement, of fireproof construction. It is to be ready about May 1, 1917.

Four Wheel Drive Auto Co., Clintonville, Wis., which has been erecting large additions to its factory all year, is now erecting a solid brick warehouse, 40 by 100 ft. in size, for storing rough castings.

Skilled foundry labor is restricting the desired extension of operations by the Western Malleables Co., Beaver Dam, Wis., which some time ago added a department for the production of castings for the motor car and tractor industry. The company owns three large foundries, two of which are operating at full capacity. One furnace in the third plant was lighted during the last week, but only one or two heats a day can be taken because there are not enough men available to handle the work.

## The Automobile Calendar

### ASSOCIATIONS

- Dec. 2-9—Electricians' Country-wide Celebration.
- Jan. 9—New York City, National Automobile Chamber of Commerce, Annual Banquet at Waldorf-Astoria.
- Jan. 9-11—New York City, Society of Automobile Engineers' Mid-Winter meeting, Thursday, Jan. 11, S. A. E. day. Annual Banquet, Hotel Biltmore. Special performance Ziegfeld's Midnight Follies.
- Jan. 10—New York City, Motor and Accessory Manufacturers' Banquet, Waldorf-Astoria.
- Nov. 16—New York City, S. A. E. Meeting.
- Nov. 23—Philadelphia, Pa., S. A. E. Meeting.
- Dec. 7—Baltimore, Md., Safety First Convention of Safety First Federation of America.

### CONTESTS

- Nov. 24 and 25—Newark, N. J., 24-Hr. Endurance Run of N. J. Automobile and Motor Club.
- Nov. 30—Uniontown, Pa., Speedway Race.
- Nov. 30—Los Angeles, Cal., Ascot Speedway 200-mile Championship Race.
- 1917
- April—Los Angeles to Salt Lake City Road Race.
- May 19—New York Metropolitan Race on Sheepshead Bay Speedway.
- May 30—Indianapolis Speedway Race, Championship.

- June 9—Chicago, Ill., Speedway Race, Championship.
- June 23—Cincinnati, Ohio, Speedway Race.
- July 4—Omaha, Neb., Speedway Race, Championship.
- July 14—Des Moines, Iowa, Speedway Race, Championship.
- July 28—Tacoma, Wash., Speedway Race, Championship.
- Aug. 4—Kansas City Speedway Race.
- Sept. 3—Cincinnati, Ohio, Speedway Race, Championship.
- Sept. 15—Providence, R. I., Speedway Race, Championship.
- Sept. 29—New York, Speedway Race, Championship.
- Oct. 6—Kansas City Speedway Race.
- Oct. 13—Chicago Speedway Race.
- Oct. 27—New York Speedway Race.

### SHOWS

- Nov. 20-25—Worcester, Mass., Show, Worcester Casino; Worcester Automobile Dealers' Assn.
- Dec. 2-9—Springfield, Mass., Show, Auditorium, H. W. Stacey, Mgr.
- Dec. 9-16—Akron, Ohio, Show for Passenger Cars Only, Market Street Gardens, Akron Automobile Dealers' Show Assn.
- Dec. 18-20—San Francisco, Cal., Automobile Salon De Luxe, Palace Hotel, I. R. Gates, Mgr.
- Dec. 30-Jan. 6—Cleveland Automobile Accessory Show, Dreamland Auditorium.
- Dec. 30-Jan. 6—Cleveland, Ohio, Sixteenth Annual Show, Wignmore Coliseum, Cleveland Automobile Club.
- Jan.—First Pan-American Aeronautic Exposition, New York City; Aero Club of America, American Society of Aeronautic Engineers, Pan-American Aeronautic Federations.
- Jan. 2-10—New York, Automobile Salon, Hotel Astor, J. R. Eustis, Mgr.
- Jan. 6-13—New York City, Show, Grand Central Palace, National Automobile Chamber of Commerce.
- Jan. 9-10—Fort Dodge, Ia., State Convention, Iowa Retail Automobile Dealers' Assn.
- Jan. 20-27—Detroit, Mich., 16th Annual Show, Detroit Automobile Dealers' Assn.
- Jan. 22-27—Rochester, N. Y., Show, Exposition Park, Rochester Auto Trades Assn.
- Jan. 23-27—Baltimore, Md., Show, Fifth Regiment Armory.
- Jan. 27-Feb. 3, 1917—Chicago Ill., Show, Coliseum, National Automobile Chamber of Commerce.
- Jan. 20-27—Montreal, Que., Automobile Trade Assn.
- Feb.—Newark, N. J., Show, First Regiment Armory.
- Feb. 3-10—Minneapolis, Minn., Show, Minneapolis Automobile Trade Assn.

- Feb. 5-9—Boston, 8th National Good Roads Show, Mechanics' Bldg.
- Feb. 10-18—San Francisco, Cal., Pacific Automobile Show, G. A. Wahlgreen, Mgr.
- Feb. 12-17—Louisville, Ky., Show, First Regiment Armory, Louisville Automobile Dealers' Assn.
- Feb. 12-17—Cedar Rapids, Ia., Show, Cedar Rapids Automobile Trade Assn.
- Feb. 18-25—St. Louis, Mo., Show, Automobile Manufacturers' and Dealers' Assn.
- Feb. 19—Pittsfield, Mass., Show, Armory, J. J. Callahan, Mgr.
- Feb. 19-24—Duluth, Minn., Show, Duluth Auto Dealers' Assn., Armory.
- Feb. 19-24—Syracuse, N. Y., Show, State Armory, Syracuse Dealers' Assn.
- Feb. 26-March 3—Omaha, Neb., Show, Auditorium, Omaha Automobile Show Assn.
- March 1, 2, 3—Urbana, Ill., Show, Automobile Trade Assn. of Champaign Co. Armory of the University of Ill.
- March 3-10—Boston, Mass., Show, Mechanics' Bldg., Boston Automobile Dealers' Assn.
- March 6-10—Ft. Dodge, Iowa, Northern Iowa Show, New Terminal Warehouse, G. W. Tremain, Secretary.
- March 14-17—Davenport, Ia., Show, Coliseum Bldg., Tri-City Automobile Trade.

**Forschler Motor Truck Manufacturing Co., Inc.**, New Orleans, made the first display of 1 and 2-ton trucks, built in the plant of the former Forschler Wagon Manufacturing Co., at the National Farm and Live Stock Show here. The company was organized June 6, capitalized at \$500,000, and will turn out vehicles steadily. Adolph Dumer, president of the Metropolitan Bank, is president.

**Ever-Tight Piston Ring Co.**, St. Louis, has increased its capital stock to \$50,000. R. Koehler is president and treasurer. The company's plant will be enlarged at once.

**Yuma Auto & Tractor Co.**, Yuma, Col., agent for Ford cars and Plowboy, Moline, Bull and International tractors in Yuma County, has built a \$14,000 fireproof garage, 60 by 140 ft., two stories, pressed brick.

**Auto Radiator & Fender Works**, Tacoma, Wash., has purchased machinery for the manufacture of automobile radiators.

## Personal

**Frank Dawson**, for several years manager of the Mogul Truck Co. of St. Louis, has resigned to go to Chicago, where he will be connected with a company that will begin the manufacture of trucks Jan. 1.

**H. H. Brooks** has been appointed superintendent of agencies for the Madison Motors Co., Anderson, Ind.

**W. T. Stalnaker**, formerly of the mechanical department of the Pathfinder Co., Indianapolis, has been appointed service manager of this company.

**D. B. Ashton**, Marion, Ohio, will handle the Cadillac and Chalmers.

**R. C. Ridge**, former superintendent of the Marathon Tire & Rubber Co., Akron, and at one time connected with the Firestone company, of that city, has succeeded C. F. Piskton as superintendent of the Porter Rubber Co., Salem.

**George Muehl** has resigned his position as assistant manager of the Cadillac Motor Car Co., Detroit branch, and will associate himself with a concern dealing in investments and bonds.

**J. F. Madden** has been appointed sales director of the Pacific Coast for the Pennsylvania Rubber Co., and C. F. Kent, of the Rocky Mountain District of the West.

**P. G. Sedley** has become manager of the direct branch of the Eisemann Magneto Co., Chicago, Ill. He was formerly manager of the New York branch of the Heinze Electric Co., Lowell, Mass. Mr. Sedley will take up his new duties on Jan. 15.

**George Tracy** has been transferred to the Newark, N. J., office of Clodio & Engs, New York distributor of the Kissel Kar.

**R. P. Ford** has joined the truck sales organization of the Peerless Motor Car Co., Cleveland. He has been connected with the automobile industry since 1906, at that time with the Overland company.

**H. W. Winn** is the new sales manager of the Southern Motors Co., Louisville, Ky.

**A. E. Ward**, formerly sales representative of the Prest-O-Lite Co., New York, has been made division manager.

**A. E. Walden** has joined the C. T. Silver organization in New York, Chalmers and Dort, where he will have charge

of the service and mechanical departments.

**F. H. Whitman** has been appointed production engineer for the National Motor Vehicle Co., Indianapolis. He was formerly connected with Dodge Brothers.

**L. H. de Graaf**, Richmond, Va., former manager of the Richmond branch for the Kissel Sales Co., has been made retail sales manager for the Terminal Motor Co., selling Hupmobile and Dort.

**Herbert W. Little** has been transferred to the Willys-Overland factory, Toledo. Mr. Little was formerly the zone service manager for the company in the New England States. He will be succeeded by F. H. White.

**George Cushing** has accepted a position with the advertising department of the Hudson Motor Car Co., Detroit. Mr. Cushing was formerly the advertising manager of the Federal Motor Truck Co.

**James Coggeshall** has been appointed manager of the wholesale department of the R. E. Taylor Co., New York, distributor for Garford trucks in this city, New Jersey and New England.

## Dealers

**Prest-O-Lite Co., Inc.**, Milwaukee, has been reorganized. C. F. Mitchell, manager of the Milwaukee branch, 18-20 Martin Street, has been promoted to division manager, with headquarters at Milwaukee. He is succeeded by E. P. Drummond.

**Carl M. Green Co.**, Detroit, has been selected as advertising agent of the Nash Motors Co., Kenosha, Wis.

**H. A. L. Motor Sales Co.**, Milwaukee, has been organized by Charles Gordon to act as distributor of the Hal Twelve in the Wisconsin and upper Michigan territory. Offices have been opened at 424 Wells Building, Milwaukee.

**Quaker City Taxi Cab Co.**, Philadelphia, has placed an order with J. D. Howley, manager of the local White branch, for 100 taxicabs, the largest order placed in this city.

**Hearn Tire & Rubber Co.**, Columbus, Ohio, has been succeeded by the Kelly-Springfield Tire Co., which has established a direct factory branch at the former location, Gay and Fourth Streets.

**Chattanooga Saxon Co.**, Chattanooga, Tenn., recently organized, announces the purchase of the Saxon agency and territorial rights from the Bill Jones Automobile Co. Until salesrooms are leased the new company will retain headquarters with the Bill Jones Co.

**All-Year Motor Co.**, Denver, is the name of a new Kissel distributing agency for Colorado and southern Wyoming. It is located at 1517 Cheyenne Place.

**Chandler Motor Co. of Colorado**, Denver, Chandler distributor for Colorado and Wyoming, has secured the Stutz distributing agency for the same territory.

**Tate-Gillham Motor Co.**, St. Louis, Dodge agent, has moved to 3107-11 Locust Street.

**J. B. Howard Motor Sales Co.**, St. Louis, will handle the Dixie Flier and the Old Hickory truck in Missouri and Illinois south of Peoria.

**Packard Missouri Co.**, Kansas City, has opened a branch at Wichita, Kan. C. G. Anderson, who formerly sold the Packard in St. Louis and in Kansas City, is in charge of the new branch.

**James Barnes**, general sales agent for

the R. E. Dietz Co., lamp maker, has moved his office from 71 Parkway to 306 and 307 Carter Building, corner Church and State Streets, Rochester, N. Y.

**Fisk Rubber Co.** has leased a four-story building at 664-66 North Broad Street, Philadelphia.

**Goodyear Tire & Rubber Co.** will move into a new building in New Orleans, at 818-20 Howard Avenue.

**Smith Form-A-Truck Sales Co.**, Indianapolis, has opened new quarters at 1327 East Washington Street.

**Springfield Body Co.** has opened a New York service station at 22 West 61st Street. Charles Baasch, formerly located at the factory in Springfield, Mass., is manager of the new service station.

**Kokomo Brass Works**, Kokomo, is represented by the Prie Sten Sales Co., Chicago.

**R. Greenlaw**, New Orleans, motor truck dealer, has added the Avery tractor.

**Mohawk Rubber Co.**, Akron, has leased a two-story building in Kansas City at 1928 Grand Avenue.

**Michelin Tire Co.**, Milltown, N. J., has established an agency in Indianapolis.

**Mohawk Rubber Co.** has established a tire branch in Kansas City at 1928 Grand Avenue. W. J. Smith is in charge.

**R. C. Greenlease**, president of the Greenlease Motor Co., distributor of the Cadillac in Kansas City territory, has purchased a site 114 by 300 ft., on which a building will be erected for the company in the spring. The site is at Twenty-ninth and McGee Streets.

**H. H. Heaps**, formerly with the Hiatt-Buick Co. at Kansas City, Mo., has been made local manager of the Reno Buick Co., Hutchinson, Kan. R. R. Rosier has disposed of all his interests in the Hutchinson Buick Co. to the new firm.

**Kelly-Springfield Tire Co.** has just opened a factory branch in Baltimore, Md. H. H. Grobe, formerly manager of the truck-tire sales at the New York branch, is manager. Carl Spoerer's Sons Co., which formerly handled the Kelly-Springfield line, has taken on the Republic Rubber Co.'s line.

**Ross Eight**, handled by J. J. McCarthy at Boston, Mass., for the past year, is now represented by the Bishop Motor Car Co.

**Connell-McKone Co.**, Boston, Mass., has opened new salesrooms at Manchester, N. H., where it recently started an Overland branch.

**Dodge Brothers** opened an agency at Holyoke, Mass., with the P. A. Williams Co., Springfield.

**Reo and Chevrolet** have been placed at Manchester, N. H., with H. C. Lintott.

**J. F. Grant** has added the Buick to his line at Brockton, Mass.

**White Motors Co.**, New Haven, Conn., is in its new home. It will give the company some 25,000 sq. ft. of floor space. The service department is already in its part of the building. The building is located at 264-266 Crown Street.

**M. Bell's Son**, Franklin, La., State distributor of the Marmon cars, has opened salesrooms at 536-538 Barronne Street, New Orleans. A. N. Jacobs of Franklin is manager of the new branch.

**Goodyear Tire & Rubber Co.**, New Orleans branch, has moved into a new three-story building at 818-820 Howard Avenue. W. E. Dermondy is manager.